Lec 1

Biological Classification

Chapter Introduction

↓

Classification detail

↓

Kingdom → Monera, protista, Fungi

Five kingdom classification

↓ Monera | ↓ protista | ↓ Fungi | ↓ Plantae | ↓ Animalia

Lichen
Mycorrhizae
Virus
Viroids
Prion
→ Extra topics.

Topic
- Habitat
- Structure
- Nutrition
- Reproduction
- Importance

Monera

① Habitat study

② Structure → size, shape, cell detail (prokaryotic cell detail) (Cell chp-8)

③ Nutrition → (Link with plant kingdom)

④ Reproduction → Asexual, Sexual

⑤ Economic Importance (Disease →)

⑥ Classification of Bacteria.

Archaebacteria

Eubacteria.
→ Mycoplasma
→ cyanobacteria.

Monera (Single cell)
→ Bacteria is sole member of Monera.
→ All member of Monera → prokaryotic cell. (nucleoid present)

→ Archaebacteria.
→ Eubacteria.
↓
together Bacteria.

Habitat :-
→ Bacteria Found Everywhere → soil, water, Land, Air

(~~Ever~~ cosmopolitan → Everywhere found)

Unusual Habitat (Difficult condition)
① Hot spring
② snow
③ deep ocean
④ inside or on ~~Aint~~ Animal and Plant (can be parasite)
⑤ Gut

Size → 3–5 µm | 1–2 µm (Diagramme)

note – Bacterial cell is smaller than Eukaryotic, Multiply very fast.

Eukaryotic cell = ~~10–20~~ (10–20) µm

10^{-9} = nm
10^{-6} m = µm (micrometer)
10^{-3} m = mm.

PPLO – Pleuro pneumonia like organism = 0.1 µm

Shape → Spherical → ○ coccus (singular)
○○ Diplococcus
○○○○ → Streptococcus (chain)
Bunch of coccus → Staphylococcus
many coccus → cocci

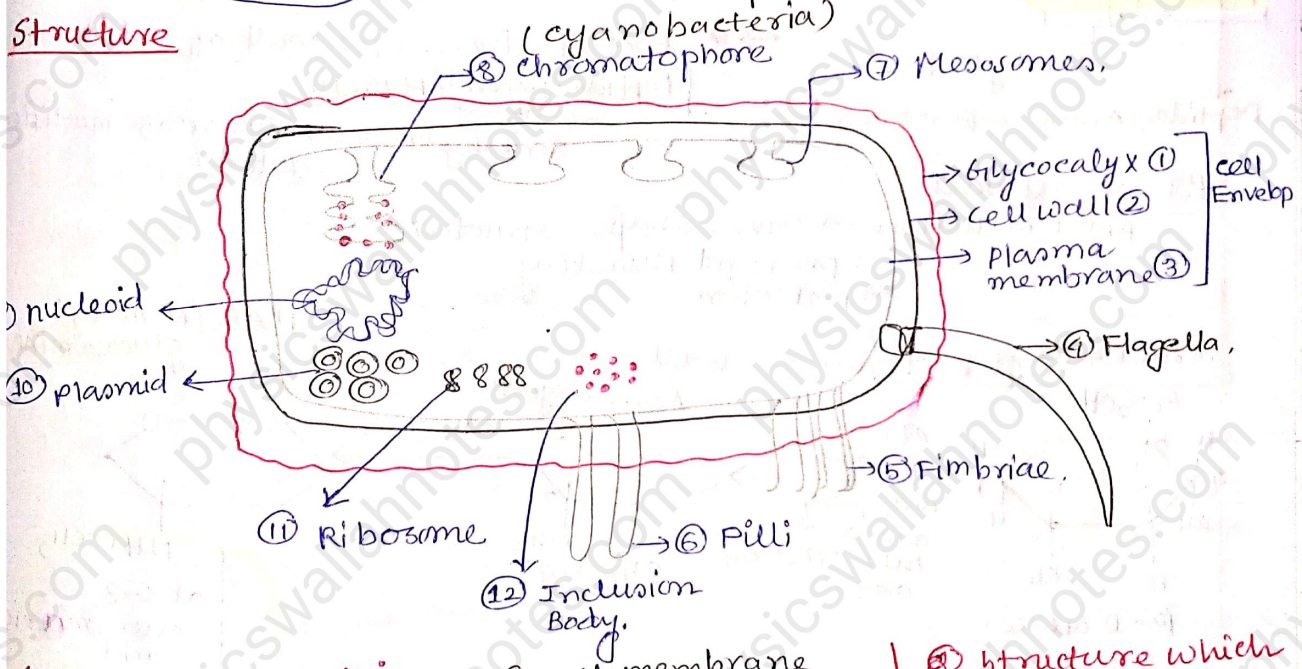
Rod shape
Bacillus (Elongated)
Plural → Bacilli
Diplobacillus
Streptobacillus

Shape – ① coccus / cocci
② Bacillus / Bacilli
③ vibrium – comma shape (Plural – Vibrio)
④ Spirillium → (Plural – Spirillia)

Bacteria on the basis of Shape – Divided into 4 groups

Q. Which of the following is most common shape.
(a) coccus
(b) bacillus
(c) spirillium
(d) vibrium.

Structure



Structure present in all Bacteria. not present in Eukaryotic cell. → ① cell membrane ② cytoplasm ③ Nucleoid ④ Ribosome

NOTE → Mycoplasma lack cell wall
→ Mesosome → Gram +ve Bacteria present
→ pilli → Gram – ve present
→ Flagella → not present in all
→ not all Bacteria have plasmid.

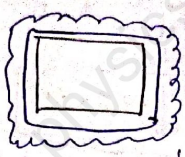
Q. Structure which are present in Both Eukaryotic and prokaryotic
(a) cell membrane
(b) Cytoplasm
(c) Ribosome (type Different)
(d) all

Cell Envelop
made up of three Distinct layer
all three layer – Different chemically) and have different function.
→ But all three layer together work as a single protective layer
↳ they are tightly placed.

(carbohydrate) Glycocalyx
cell wall (carbohydrate)
cell membrane (Lipid)
cell wall – carbohydrate + Amino acids.

① Glycocalyx (mucopolysaccharide) (chemically modified carbohydrate)

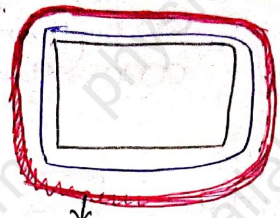
Slime layer | Capsule



Slime layer is loose and thin

→ prevent from desiccation (water lose)

→ help in attachment.



→ Capsule is thick and tough.

→ It protect from host and give ability to bacteria to cause infection.

② Cell wall of Bacteria

→ Five kingdom — Monera → cell wall present
- protista — present in some group (silica, cellulose)
- Fungi → cell wall → chitin (carbohydrate)
- Plantae → cell wall → cellulose
- Animalia → no cell wall

not chitin / not cellulose (cell wall in Bacteria is made up of peptidoglycan)

peptidoglycan = carbohydrate + Peptide / Amino acid chain.

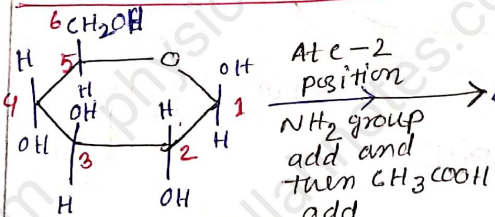
→ Ⓐ Bacteria have cell wall of Peptidoglycan / Murein

carbohydrate (polymer of modified glucose)

Role of cell wall

Rigid structure → Give shape, structure.
→ prevent Bursting
→ protection

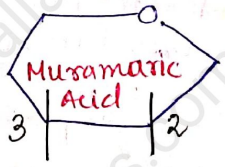
Structure of Bacterial cell wall



NAG (N-Acetyl glucosamine)

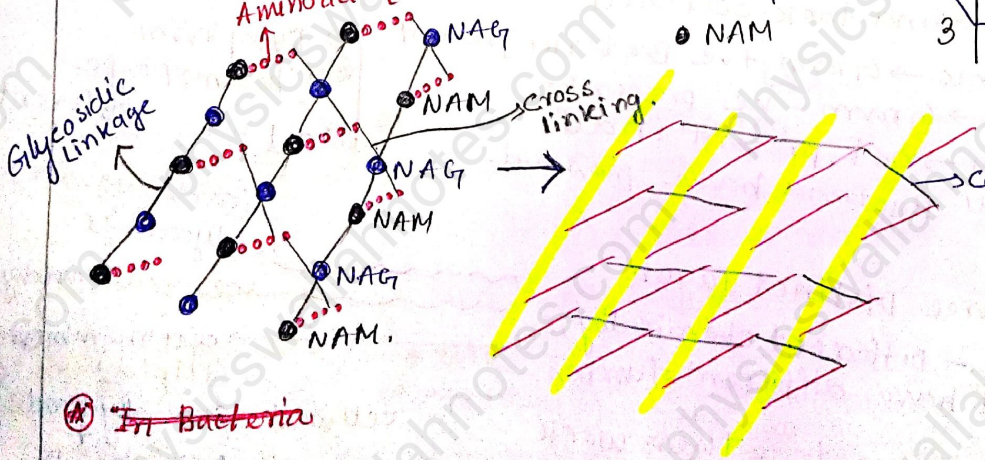
at c-3 muramic acid

N-Acetyl muramic



NAM

NOTE :- Bacteria cell wall have polymer of modified Glucose → NAG and NAM



Ⓐ ~~In Bacteria~~

④ In Bacteria cell wall - NAG and NAM alternate and have Glycosidic Bond
→ From NAM - 4 Amino acid attach and they form cross linking.
→ cross linking Require to provide strength — cell wall.

NOTE - Penicillin prevent cross linking → prevent cell wall formation.
↓
Bacteria cell kill due to osmotic bursting

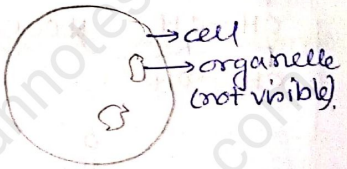
NOTE - Mycoplasma not have cell wall (no effect of penicillin on Mycoplasma)

NOTE - Lysozyme break cell wall — By Digesting Glycosidic Bond
↓
Enzymes in Body secretion

Lec 2

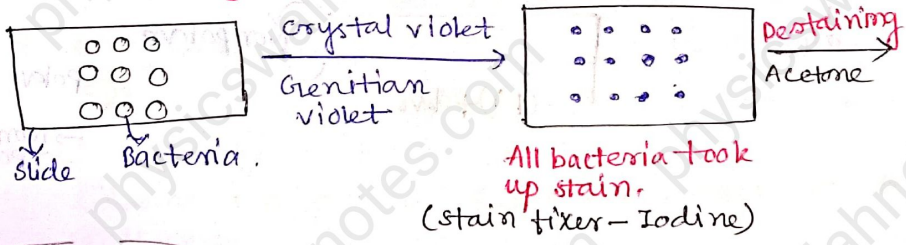
Classification of Bacteria:-

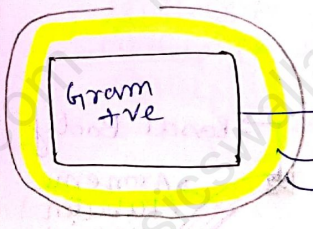
(I) According to Shape → ① coccus ② bacillus ③ vibrium ④ Spirillium.

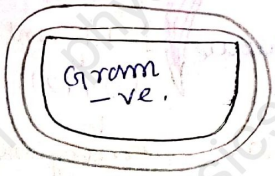


(II) Gram +ve and Gram -ve
↓
scientist — (staining technique)
↓
christian Gram.

Gram Staining:-







→ on the basis of thickness of cell wall (cell Envelop (NCERT)
① Gram +ve
② Gram -ve

Gram positive

→ cell wall thick - NAG
NAM
(Amount More)
→ Mesosome present
→ pili and porins and toxins Absent
Ex → Streptococcus
→ Streptomyces (Antibiotic)
→ Mycobacterium
→ Frankia

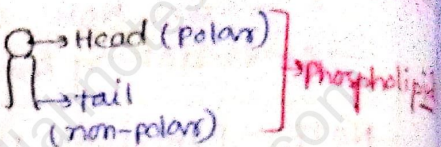
Gram Negative

→ cell wall thin (NAG and NAM - Amount less)
→ Mesosome Absent
P - porins
P - Pili
T - Toxins
Example: → Mycoplasma
→ cyanobacteria
→ E. coli
→ Rhizobium
chromatophore +nt

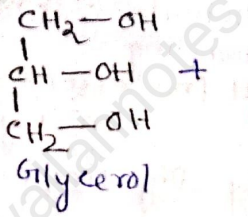
(Cell membrane)

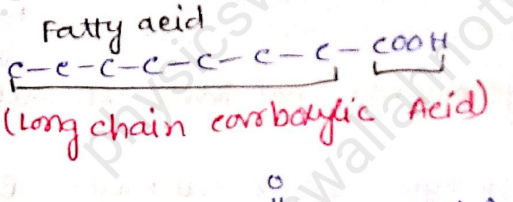
③ Plasma membrane (NOTE- This is similar in Prokaryote and Eukaryotes)

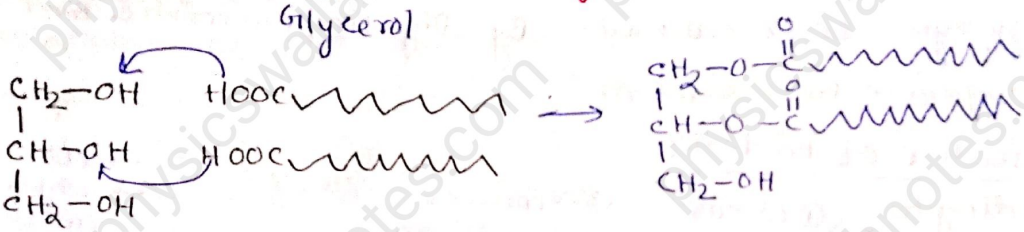
→ Structure :- Lipid Bilayer

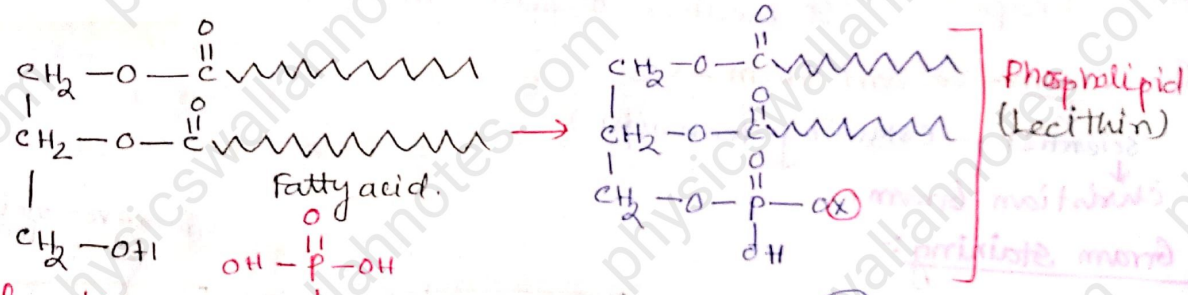


Phospholipid →





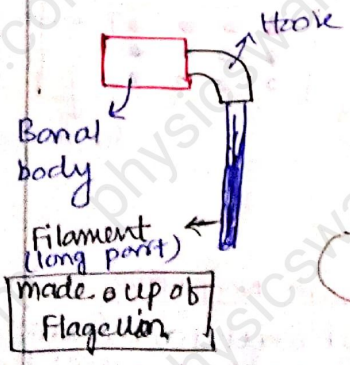


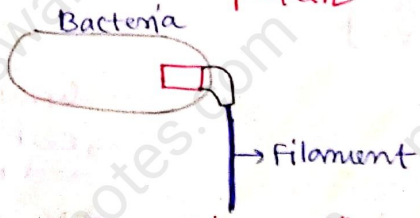


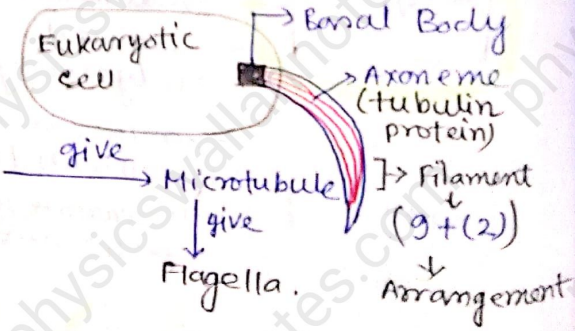
④ Flagella :-

→ Feature of single cell

→ present in both Prokaryotic and Eukaryotic







→ Flagella it present cell is motile

→ Bacterial Flagella structure is ~~to~~ different from flagella of Eukaryotic cell.

→ ~~Fig~~ Flagella number and Distribution is Different

→ Flagella attach with cell wall and plasma membrane

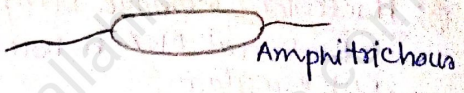
Bacteria cell

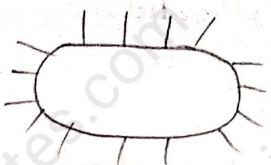
(Non-motile) | (motile)

* No Flagella / atrichous
Example :- cyano bacteria
→ coccus
→ Mycoplasma

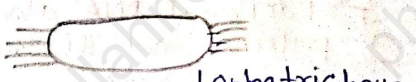
Flagella present.

(Monotrichous)





Ex - E. coli



(5) Pili (Less common)

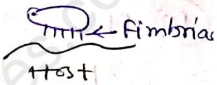
Shape → tubular
→ Less in number, made up of special protein (pillin)

Role :- In some Bacterial cell Sexual Reproduction Help)

(6) Fimbriae (more common)

Shape → Bristle shape
→ More in number, small size.

Role - Attachment.

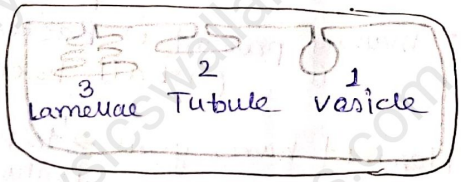


Both have no role in motility.

Surface Structure :- Fimbriae + Pili + Flagella.

(7) Mesosomes :-

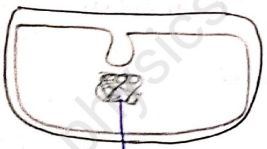
→ Plasma membrane - infolding or Extensions.



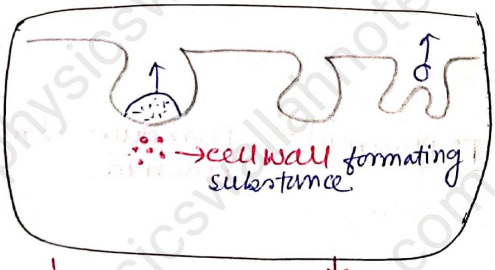
Different Shape ① Vesicle
② tubule
③ Lamellae

Present in (Gram +ve) Bacteria.

Role - ① Some Enzymes for Respiration attach on Meso somes to increase surface area,
② Help in cell wall formation.
③ Help in secretion.
④ Help in DNA Replication
⑤ Help in cell Division.

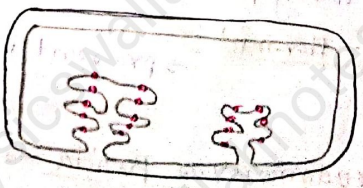


Nucleoid - Attach on mesosomes.



(8) Chromatophore (cyanobacteria)

→ Membrane Extension in Gram -ve (cyanobacteria)
→ Pigment present
→ Chromatophore have similar role (Analogus) to thylakoid)

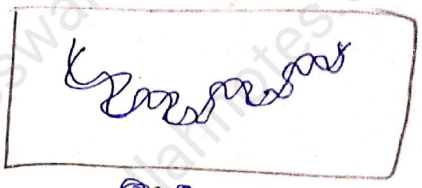


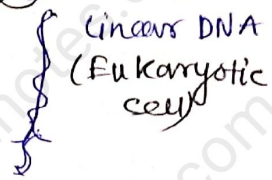
Due to chromatophore, cyanobacteria is connecting link B/W Prokaryotes and Eukaryotes.

Mesosome
→ Gram +ve
→ Respiration.

chromatophore
→ Gram −ve (cyanobacteria)
→ Photosynthesis

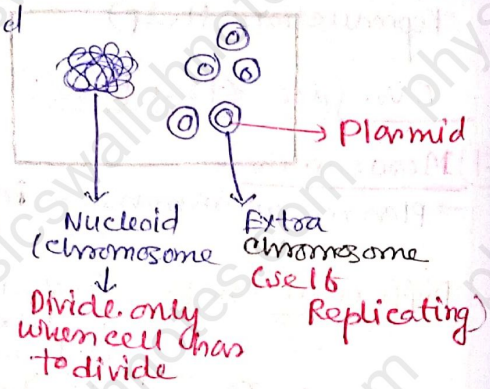
⑨ **Nucleoid** [Genomic DNA / Prochromosome]
→ Bacterial DNA is Double stranded But circular
(Exception = Mycoplasma) linear
→ Bacterial DNA also have some basic proteins not Histones.
→ Bacterial DNA is packaged in form of large loops with the help of some Basic protein
→ Genomic DNA means all important Gene present.





NOTE:- We consider Bacteria as Haploid with single chromosome.

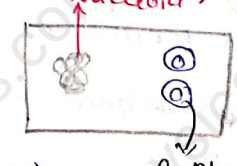
⑩ **Plasmid:-**
→ 4 Feature → Extra chromosomal
→ circular
→ Double strand
→ Self Replicating
} Have gene Nucleic acid



→ mainly present in Bacteria (not all bacteria)
→ Plasmid have gene → (to provide special feature to cell)

Type of Plasmid:- (In Biotechnology)

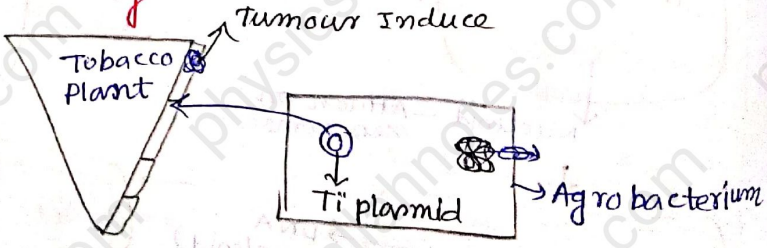
① R-Plasmid — Resistance Plasmid



→ survive in presence of antibiotic

→ not survive in Antibiotic

② Ti Plasmid → Tumour Inducing Plasmid



③ F-Plasmid :-
(Fertility Plasmid) → Help in Sexual Reproduction.

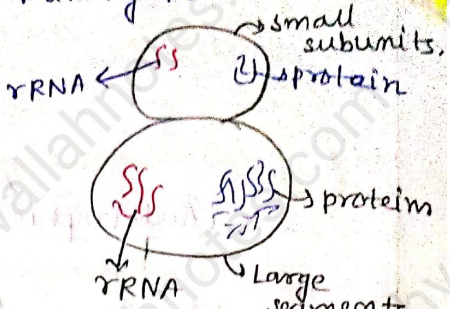
④ Col-Plasmid :-
→ present in Bacteria → which produce Colicine
↓
This protein can kill other Bacteria.

⑤ Pseudomonous Putida → Bacteria have Degradative Plasmid
↓
oil spills → Break.

Ribosome (15–20 nm)

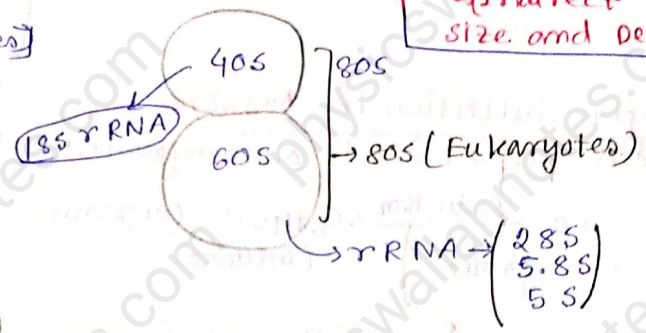
(11) **Ribosome**:- organelle → without membrane.
→ Location – cytoplasm of Bacteria and Eukaryotic cell

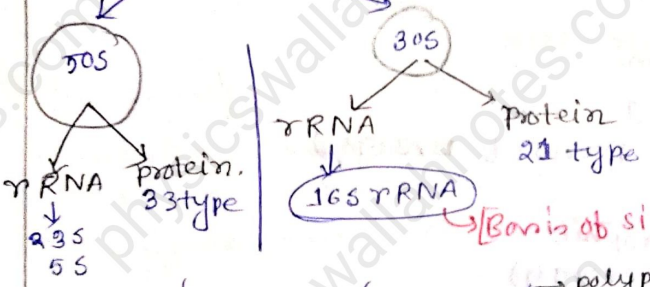
Role – protein synthesis
→ Ribosome → have two subunit
→ Prokaryote – 70S (complete Ribosome)
Eukaryote – 80S (complete Ribosome)



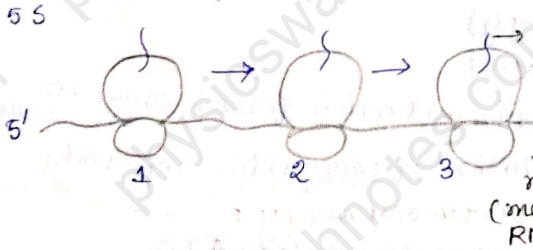
70S [Prokaryotes]

S → Svedberg constant (unit)
[Indirect measure of size and density]

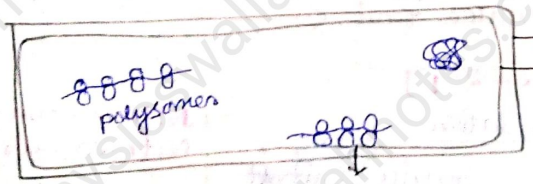




[Basis of six kingdom classification]



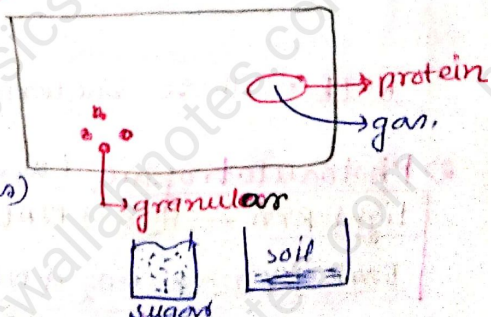
→ [polyribosome – many ribosome attach on single mRNA it is known as polyribosome]
[polysomes]



Ribosome found attach with plasma membrane to ~~ta~~ ~~come~~ exit the protein that form by ribosomes.

(12) **Inclusion Bodies**:- → not lipid membrane
→ they are (without membrane structure)
→ Granular, Insoluble in cytoplasm.
→ Role – (Storage)

Example:- ① Phosphorus granule (Storage Phosphorous)
② Sulfur granule (
③ glycogen granule
④ cyanophycean – store protein.
⑤ Gas vacuole → storage of gas (protein membrane)
only in prokaryote
[Example → cyanobacteria,
→ Green sulphur
→ Purple sulphur Bacteria]



Lec 3

Nutrition in Monera

→ Bacteria simple in structure → complex in Behaviour

↓

Different type of metabolic diversity

↓

(Different type of nutrition)

- Nutrition
  - Autotrophic
    - ① Chemoautotrophic
    - Photoautotrophic
      - ② Oxygenic
      - ③ Anoxygenic
  - Heterotrophic
    - ④ Saprophytic
    - ⑤ Symbiotic
    - ⑥ parasitic

Autotrophic nutrition in Monera

(which can prepare ~~it~~ own organic food)

CO_2 (Inorganic) —Reduction→ $C_6H_{12}O_6$ (organic) (Glucose)

① Energy Require ② Hydrogen Require

Autotrophic nutrition (on the Basis of Energy)

- Chemoautotrophic (From chemical Rxn) (No pigment)
- Photoautotrophic (use light energy) (pigment Require)

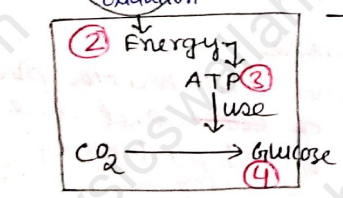
1) Chemoautotrophic (chemosynthetic) (this nutrition found only in monera)

→ outside cell oxidation of inorganic compound.

→ This oxidation produce → Energy

→ cell use this energy to make ATP

→ ATP use to make food.



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Ex- NH_4^+ —oxidation→ NO_2^- (nitrite) (~~nitrite~~) — Nitrosomonas, Nitrococcus

NO_2^- → NO_3^- (nitrate) — Nitrobactor, Nitrocystic

NOTE - These bacteria involve in Recycling of [P, S, N and Fe]

2) Photoautotrophic (use light energy, pigment compulsory)

Light Rxn → $H_2O + NADP^+ \rightarrow NADPH + O_2$

Dark Rxn → $CO_2 + NADPH \rightarrow Glucose + NADP^+$

↓ Source of Hydrogen (H_2O)

On the Basis of source of Hydrogen two type of Photoautotroph.

Sunlight

Oxygenic (H_2O break)

Light Rxn → Source of Hydrogen = H_2O

By product = oxygen.

Group = (cyanobacteria)

Anoxygenic

↓

Source of ~~H_2O~~ H_2 is not water,

→ not break water.

Oxygenic (Pigment = chla)
Group → cyanobacteria
→ Spirulina
→ Oscillatoria
→ Nostoc
→ Anabena.

Anoxygenic
- H_2S Break — Sulfur = By product — Sulfur Bacteria
  - Pigment → Green – Bacteriophyll
  - Purple – Bacteriopurpurin
- C–C–C–C (non-sulfur bacteria) — Aliphatic carbon compound break

→ H_2S break, Bacteriophyll → Green sulfur bacteria.
→ H_2S break, Bacteriopurpurin → purple sulfur bacteria.
→ H_2S (not), Bacteriophyll → Green non-sulfur bacteria.
→ H_2S (not), Bacteriopurpurin → Purple = non-sulfur bacteria (Rhodospirillium.)

~~Autotrophic~~

Q) Few Example are Given –
Anabena, nostoc, Green non sulfur bacteria, oscillatoria, Green Sulfur Bacteria, Rhodospirillium, Nitrobactor, Nitocystic

→ oxygenic → Anabena, nostoc, oscillatoria.
→ Anoxygenic – Green nonsulfur bacteria, Green sulpher bacteria. (Rhodospirillium)
→ chemoautotrophic → Nitrobactor, Nitrocystic
→ Photoautotrophic → oxygenic, anoxygenic
→ Autotrophic → chemoautotrophic + Photoautotrophic.

Heterotrophic Nutrition :– (most Abundant)

① Parasitic → many bacteria is parasite on plant and animal.
- cholera — Vibrio cholerae
- Typhoid — salmonella typi
- Tetanus — Clostridium tetani
- citrus canker — xanthomonas citri

② Symbiotic → Ex – Rhizobium – Fix N_2 in legume.
Ex – Frankia – Fix N_2 in non-leguminous (Ex Alnus cauarina)

③ Saprophytic :– They are decomposers.
Enzyme — Ex – Lactobaccilus.
→ dead → Break

★ NOTE – Heterotrophic nutrition > Autotrophic nutrition.

NOTE – Maximum Among Heterotrophic is Saprophytic

Q) Few examples are Given

Anabena (Cyano), Nitrosomonas (chemo), Rhizobium (symbio), Mycobacterium (Parasitic), Green Sulfur Bacteria (Anoxygenic), Nitrocystis (chemo), Ecoli (sapro), lactobaccilus (sapro), ~~Pseud~~ Pseudomonas (sapro)

How many are

① Oxygenic → Cyanobacteria – 1
② Anoxygenic → 1
③ Chemoautotroph – 2
④ Photoautotroph = 2 (oxy + Anoxy)
⑤ Autotroph → 4 (Anoxy, oxy, Chemo)
⑥ parasitic → 1
⑦ Saprophytic → 3
⑧ Heterotrophic – 5
⑨ Symbiotic → 1

Q) ~~thiobaccilus~~

Five kingdom

- Monera
  - → chemoautotroph (*)
  - → oxygenic
  - → Anoxygenic (*)
  - → Saprophytic
  - → parasitic
  - → Symbiotic
  - 6
- protista
  - – oxygenic
  - – Saprophytic
  - – parasitic
  - – symbiotic
  - 4
- Fungi
  - only Heterotrophic
  - → saprophytic
  - → symbiotic
  - → parasitic
- Plantae
  - oxygenic
  - → Animalia (Heterotrophic) ← (Holozoic) ফিরে খাওয়া

Q) In How many kingdom — oxygenic nutrition, only oxygenic Plantae
↓
Monera, Protista, Plantae.

→ Heterotrophic – Monera, Protista, Fungi, Animalia.
only Heterotrophic → Animalia, Fungi
Anoxygenic → Monera.
Chemoautotroph → Monera.

(*) Reproduction in Monera

→ Reproduction is a biological process to make / produce progeny of its own kind.

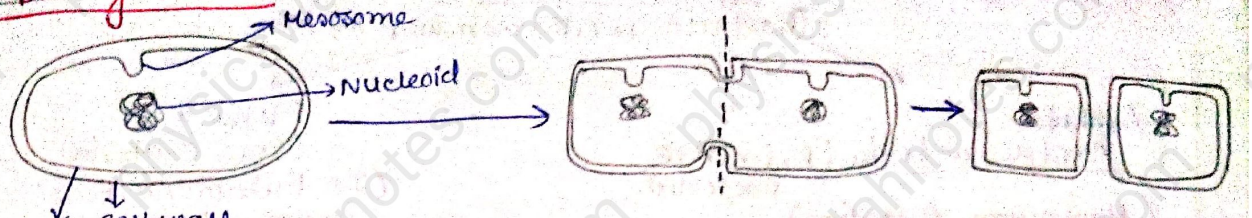
- A sexual (single parent involve) Less no variation.
  - Fission / Binary Fission (Favourable condition) (most common)
  - Spore / Endospore (unfavourable condition)
- Sexual
  - main purpose is variation.
  - (other Bacteria) DNA
  - → In bacteria, no ~~tur~~ true sexual Reproduction occur.
  - → Some Primitive method of DNA transfer

NOTE :- Most common Method is Fission / Binary Fission.

NOTE – Episome – Some time F – Plasmid Fuse with Nucleoid.

P.T.O

Binary fission :-



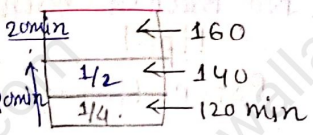
→ Binary fission → cell Division in Bacteria,
→ no spindle fibre form (not mitosis)
→ This division is known as Amitosis

→ Mesosome help in cell Division.

Generation time :- time in which Bacterial cell Double.

→ E.coli → 20 min

Q) A glass is 1/4 ~~full~~ filled with E.coli in 120 min. It Generation time is 20 min → In how much time, it will be completely filled.



(a) 160 min
(b) 360 min
(c) 80 min
(d) 140 min.

(120 min + 20 + 20) = 160 min

$\frac{1}{4} \xrightarrow{20\,min} \frac{1}{2} \xrightarrow{20\,min} 1$

Endospore formation / Spore formation :-

culture plate (Bacteria)

60°—70°C

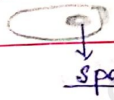
Maximum Bacteria get killed

→ Bacteria which survive spore (Endospore) form.

↓ Harsh condition.

living part

NOTE :- Clostridium and Baccilus can form Endospore.



spore

Sexual Reproduction :-

Why Bacterial sexual Reproduction is known as primitive.

~~True sexual~~ Normal sexual Reproduction involve :-

1. Gamete
2. Zygote
3. meiosis
4. sex organ
5. Fertilization
6. Variation.

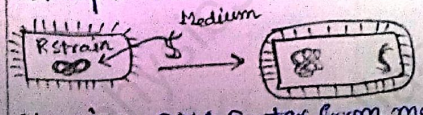
Bacteria

→ Only variation occur due to some primitive method of DNA transfer

Type of sexual Reproduction

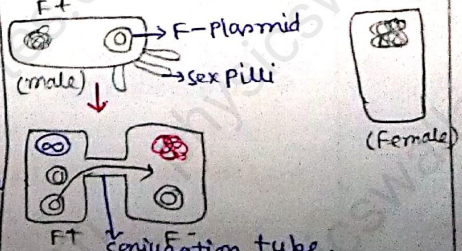
① Transformation

(1928 - Griffith - Mice)
Streptococcus Bacteria.



Meaning - DNA Enter from medium
→ change / transformation in Phenotype.

② conjugation



→ Transfer of Bacterial DNA (Plasmid) from one Bacteria to Another by conjugation tube (by sex pilli)

Transduction

→ virus mediated gene transfer from one to Another.

Type of bacteria

(Bacteria is sde member of Monera)

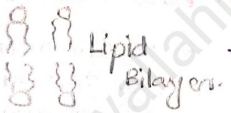
Archaebacteria (Primitive Bacteria)
(Maximum Question)

Eubacteria
(True Bacteria)
(In Eubacteria. Few important group)
- Cyanobacteria
- Mycoplasma.
- Actinomycetes

Archaebacteria (primitive Bacteria)

→ They found in harsh condition / unfavourable condition (High temperature, low pH, anaerobic, High salt)

→ lack peptidoglycan

Archaebacteria (gram -ve)	Eubacteria.
NCERT cell wall Different (pseudo murein)	cell wall = peptidoglycan / Murein
→ cell membrane :- Monolayer → Branch chain lipid → Ether linkage.	 No Branch chain lipid Ester linkage.
Structure of 16S rRNA → Different in Both.	Five kingdom (Archaebacteria Eubacteria in some group) → Monera
NOTE – Six kingdom classification is Based on 16S rRNA	
→ Some Archaebacteria have histone present.	→ Histone Absent

Similarity
- 70S ribosome.

Type of Archaebacteria :-

Methanogen
→ without O_2 survive. (obligate Anaerobe)
CO_2 → Methane
Location → Marshy area.
→ Ruminant (Cow, Buffalo) Stomach
Ex – Methanobacterium

Halophiles
Found in High salt concentration (2-5 M)

Thermoacidophile
→ ~~Thes~~ Temperature High (80°C)
→ PH low (2)
→ (sulfur spring)
↓
cell wall Different help in survival
Ex – Thermus aquaticus (Thermostable Enzyme)

lec 4

Eubacteria

→ True Bacteria
→ If cell wall present — peptidoglycan
70S Ribosome

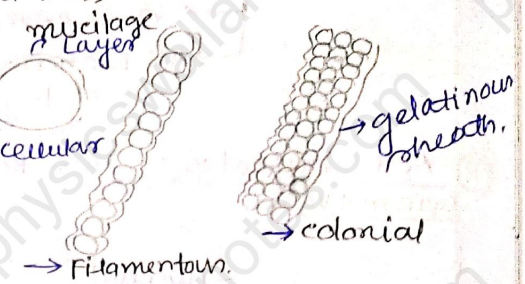
Some Group Eubacteria

NCERT → (a) cyanobacteria / BGA (Blue Green Algae)
(b) Actinomycetes
(c) Mycoplasma

Cyanobacteria :- (old name = BGA)

Habitat :- Aquatic (Freshwater + Marine), terrestial (moist soil)

Structure :- → Unicellular
→ Filamentous
→ colonial



Nutrition in cyanobacteria:
oxygenic photosynthesis
(chla and PS II present)

Cell Detail :-
→ cell wall = peptidoglycan
→ Flagella → Absent
→ Pigment → chla + Blue pigment (phycocyanin)
Red Pigment (phycoerythrin).
→ Storage → cyanophycean granule — Amino acid storage or protein
cyanophycean starch → Carbohydrate storage.

located on chromatophore

Gas vacuole present

(Gram – ve) bacteria.

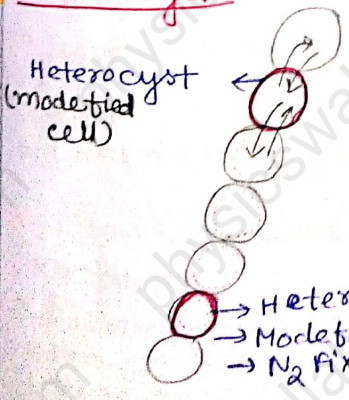
a) Non-motile cell present in
① chlamydomonas
② gamete of Ulothrix
③ Asexual of fucus.
④ Anabena.

Flagella Absent
→ cyanobacteria
→ coccus
→ Mycoplasma.
→ Red Algae.
→ Spirogyra (gamete – non motile)

Example - Spirulina
Oscillatoria
Anabena
Nostoc

Heterocyst :-

Some → All cyanobacteria form Heterocyst



Symbiotic N_2 fixation :-
Anabena and nostoc fix N_2 in free form and symbiotically.

Examples of symbiotic
(a) Lichen – coral have cyanobacteria.
(b) Azolla – leaf have Anabena. (Biofertilizer)
(c) Coralloid – Root in cycas have Anabena and Nostoc.

(*) cyanobacteria Algal Bloom (Pollution)
(*) Crown gall is due to – Agrobacterium
(*) Clostridium botulinum – Responsible for Food Poisoning.

2) **Mycoplasma**- (normal Bacteria cell = 2–5 μm)
(Mycoplasma size = 0.1–0.15 μm)
Smallest cell (PPLO – Pleuro Pneumonia like organism)

Feature →
- cell wall Absent → shape not fix (Pleomorphic)
  - → Gram –ve
  - → pencilin not Effective.
- → Habitat → Saprophytic (Free living)
  - → parasitic (cause Disease in plant and Animal Both)
- → can survive without O_2
- → All Bacteria have circular double stranded DNA
  But Mycoplasma have linear DNA.

3) **Actinomycetes** :- This Bacteria is known as 'Ray Fungi'.
Gram +ve

Ex → Frankia
→ Mycobacterium
→ Cornbacterium
→ Streptomyces → Maximum Antibiotics.

Q) 70S Ribosome present in → Prokaryote.
(a) Albugo
(b) yeast / saccharomyces.
(c) Ray Fungi ← Bacteria.
(d) Chlamydomonas.

(e) connecting link between Bacteria and Fungi

PROTISTA

→ First Eukaryotic cell kingdom.

→ Basic Feature:-
→ classification (Groups feature)

Protista → Basis Feature (Protista was created as third kingdom in 3 kingdom classification) — Ernst Haeel

① Unicellular Eukaryotes (single cell) [This kingdom not have well defined Boundary some Examples are present in protista as well as other kingdom (Ex- chlamydomonas)]

② Well defined nucleus → nuclear Membrane present
Histone present.

③ Mostly Aquatic :- Habitat

④ Membrane Bound organelle present (ER, Golgi, Mitochondria, chloroplast)

⑤ True Sexual Reproduction (Gamete Formation occur and zygote)

⑥ Some can have Flagella and cillia → made up of tubulin protein
9+(2)

cillia → only Eukaryote

(tubulin protein → Microtubules form → 9+(2) arrangement → this give flagella.

⑦ Mitosis and Meiosis can occur.

Monera (	Protista
→ cell wall - peptidoglycan	- not peptidoglycan, not present in all.
→ 70S	→ 80S.
→ Membrane Bound organelle Absent	→ Membrane Bound organelle present.
→ Flagella - Flagellin protein	→ Flagella - tubulin (9+(2))
→ Mitosis and Meiosis Absent	→ Mitosis and Meiosis occur
→ Primitive sexual Reproduction.	→ True sexual Reproduction.
→ Most common nutrition ↳ saprophytic	→ mostly photosynthetic.
→ (chemoautotroph, Anoxygenic) type of nutrition present	→ chemoautotroph and anoxygenic type of nutrition Absent.

Q) 80S Ribosome present
① Mycoplasma
② Anabena
③ Diatom - Protista.
④ Streptococcus.

Q) oxygenic photosynthesis present in:
① sea cucumber
② Mycoplasma ← 70S Ribosome present.
③ Agaricus
④ chlamydomonas (Green algae)

Classification of Protista (on the Basis of nutrition)

Photosynthetic protist
① → Chrysophytes
② → Dinoflagellates
③ → Euglenoids
→ (Similarity with Algae)
(Chla, PSII, oxygenic)

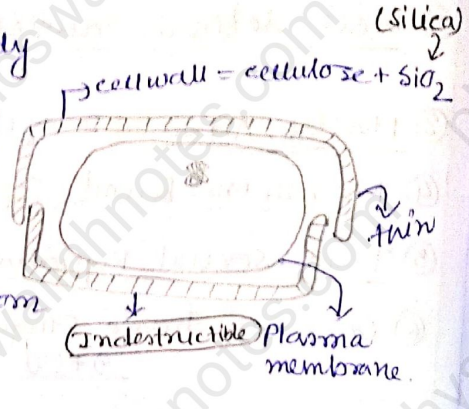
Saprophytic protist
④ → Slime mould (Similarity with fungi)

Holozoic / parasitic
⑤ → protozoa. (Similarity with Animalia).

Chrysophytes (golden) (plant) → Golden Algae (desmids). → Diatoms → mainly - study

Habitat: Fresh water + Marine

Structure - (mainly cell Detail) ((Microscopic)) → (Diatom) → cellwall → Like a soap box (Silica) → cellulose + SiO_2



Silica indestructible → deposited at Bottom of water Body.

name as 'Diatomaceous Earth'.

- Flagella → Absent (Float with water current ⇒ known as plankton.

Pigment → Chla compulsary / oxygenic photosynthesis (Ph present in Plastid)

Storage → Chrysolaminarin (not in NCERT)

Nutrition → oxygenic photosynthesis.

Importance: - ⓐ 'Diatomaceous Earth'.
ⓑ polishing. → Being gritty
ⓒ Filtration of oils and syrups.
ⓓ They are chief producers ocean.

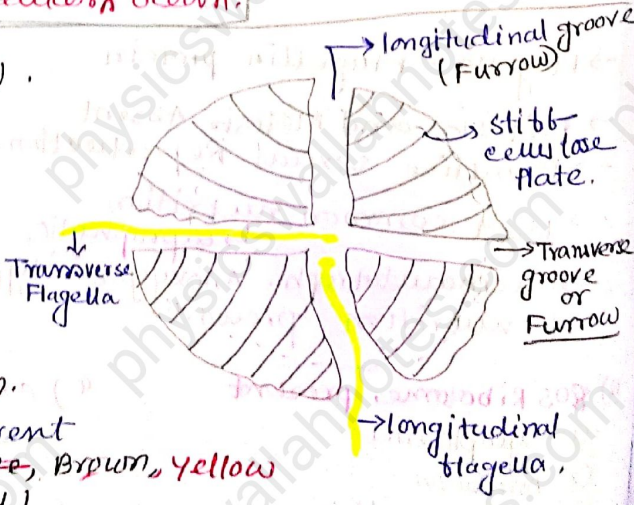
Dinoflagellates: - (two Flagella).

Habitat: - Marine.

Structure: - cell Detail.

cell wall - stiff cellulose plates.

Flagella - two, Different direction (transverse, longitudinal) (at some plate they form furrow)



Pigment: - Chla + r-phycoerthrin.
[Dinoflagellate Different colour - (Blue, ~~orange~~, Brown, Yellow Green, Red)

Storage - starch.

Nutrition - oxygenic photosynthesis

Importance: - Gonyaulax (Dinoflagellate) - Red colour → Divide very fast By Binary fission → Ocean Appear → Red = Red tide
Gonyaulax

→ Some produce toxin (Saxitoxin) (large numbers) → Neurotoxin - Responsible for Death of fishes.

NOTE - Noctulica show Biolumiscence (Bioluminescence → Ctenophora.

Euglenoids (Predater + Photosynthetic) Examples- Euglena

Habitat :- Freshwater (stagnant).

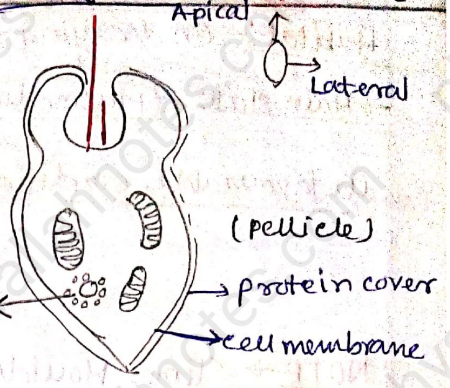
Cell detail → cell wall → Absent

Flexible protein cover known as → pellicle

Flagella - 2, Apical, unequal. (one short, one long)

Pigment - like higher plant [chl a and chl b]

~~pyrinoids~~



observation

(a) (a) Euglenoid
(b) Chlamydomonas
(c) kelp

(a) chl a present in
(a) cyanobacteria
(b) photosynthetic protist
(c) Plant kingdom
(d) all.

(a) Apical unequal - a.
(a) Apical Equal - b
(a) Lateral unequal - c

(a) chl b present
(a) Nostoc
(b) Fucus
(c) Euglena.
(d) Porphyra.

chl b
Plant kingdom -
Green Algae
Bryophytes
Pteridophytes
Gymno
Angio
→ Euglenoids

Storage - paramylum. (Pyrinoids present in Euglenoids)

Nutrition - oxygenic Photosynthesis → when light present
Light Absent — predator of small ~~plant~~ animal
(Autotrophic + Heterotrophic) — (Mixotrophic)

(*) connecting link between plant and Animal

contractile vacuole (Remove excess water)

Reproduction :- Binary fission — longitudinal.
→ not sexual Reproduction occur

ec 5 Feature	chrysophytes	Dinoflagellates	Euglenoids
(1) Habitat	Fresh water + Marine	Marine	fresh water (stagnant)
Structure cell wall-	Silica indestructible	cellulose stiff plate	Absent protein cover pellicle
Flagella	Absent (Plankton)	2, Different in position	2, Apical, unequal.
Pigment	chl a	chl a + r Phycoerythrin	chl a + chl b
Storage	chrysolaminarin	starch	paramylon
Importance	→ Diatomaceous Earth → syrup making → Polishing, → filtration → chief producers	→ Red tide (Gonyaulax) → Poison (toxin) Noctiluca show (Bioluminescence)	→ predator of higher plant (like pigment) chl b
	(*) Rejuvenescent Spore or Auxospore	(*) Whorling whip or swirling movement (*) Devoid of histone	(*) Locomotion in euglena occurs in ~~which of the~~ Flagella, and Metaboly.

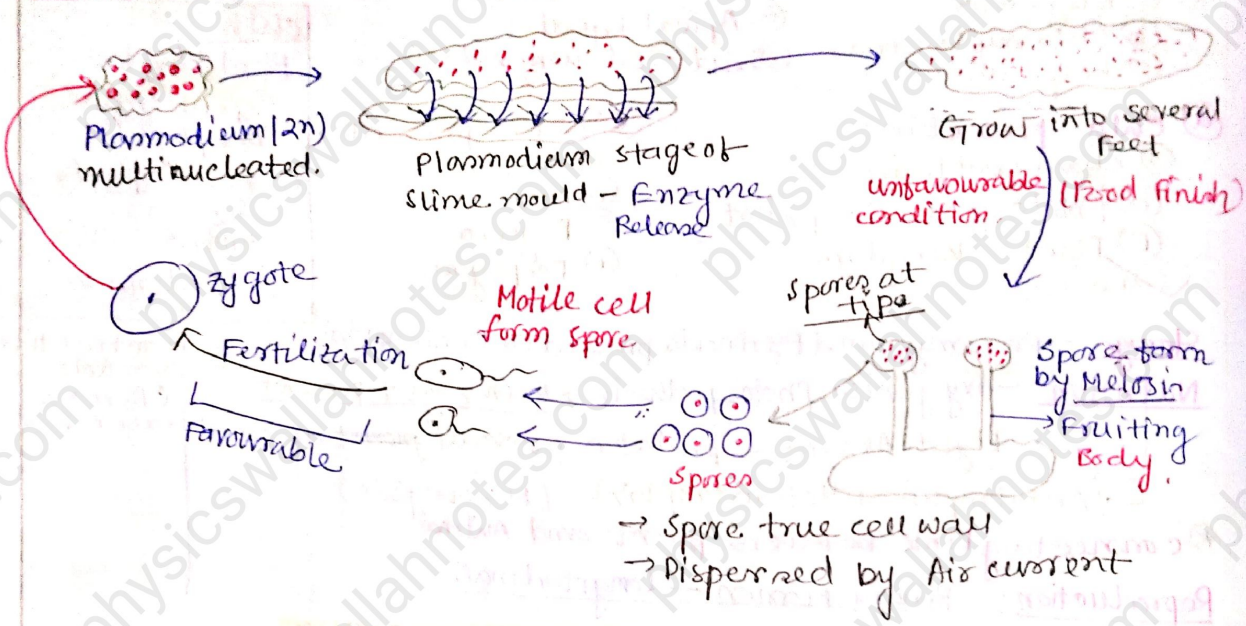
SLIME MOULDS

Habitat:- On decaying twig

→ Main state (Plasmodium) - Growing size
- Enzyme Release

Unfavourable condition - Fruiting Body Form
↓
→ to spore form (True cell wall), survive many years
→ Disperse By Air current.

NOTE → Slime Moulds have few feature similar to Fungi also.



Protozoa:-

→ Feature similar to Animalia → cell wall Absent
→ Heterotrophic (parasitic, predator, Free living)

protozoa (on the Basis of locomotory structure)

Ⓐ Amoeboid
Ⓑ Flagellates
Ⓒ Ciliates
Ⓓ Sporozoans.

silica cover

Ⓐ Amoeboid:- Habitat - Freshwater, marine, terrestrial. (moist soil)

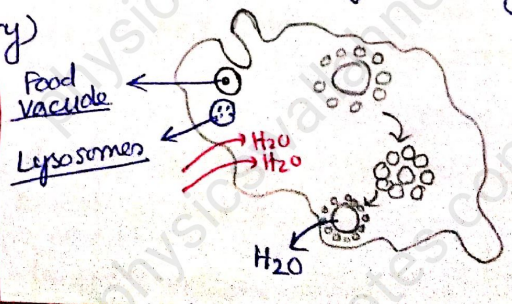
Amoeba - Freshwater

→ pseudopodia (False Feat)
↓
with the help of Pseudopodia - (prey capture)

movement - help By - Microfilament)

→ Food vacuole → which fuse with lysosomes.
→ Excess water Enter which is Removed by - contractile vacuole. (size can get change)

Parasitic - Entamoeba Histolytica.
(Amoebic dysentery)



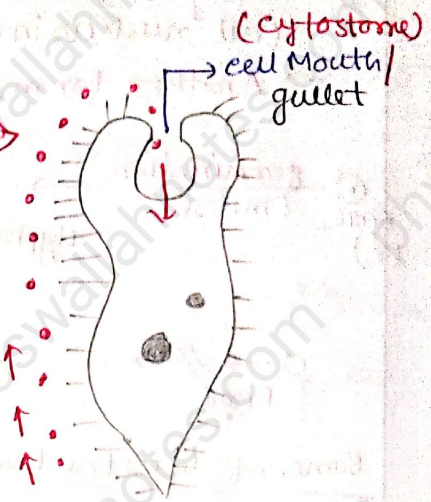
Q) Protozoa having silica
ⓐ Diatom
ⓑ Marine Amoeboid
ⓒ Fresh water Amoeboid
ⓓ Dinoflagellates.

(b) **Flagellates** – Free living and parasitic.
→ Free living form move with the help of flagella.

Ex – Trypanosoma (sleeping sickness)

(c) **Ciliates** – cilia present

Ex – Paramaecium – cilia move and also move water along with food at gullet
(aquatic)
→ Transverse Binary fission.



(d) **Sporozoans:-** → No locomotory structure.
→ Infective stage – spore.

Ex – plasmodium (parasite) (Life cycle – Human Health and disease)

FUNGI

Basic Introduction
Habitat
Structure
Nutrition
Reproduction → vegetative, Asexual, sexual
Economic Importance ⇒ LSD

(A) Classification of Fungi

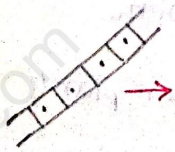
Introduction :- → Diverse kingdom (structure nutrition)

→ yeast → Ethanol, Bread
→ Agaricus – Mushroom (Fungi)
→ toad stool – poisonous fungi
→ puccinia → wheat Rust (parasitic)

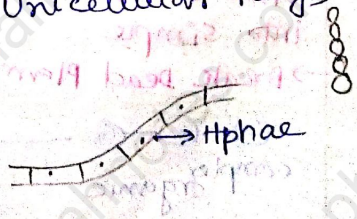
(A) Bacteria and fungi are most important decomposers.

Habitat :- → Spores available Everywhere (land, air, water) = cosmo politan
→ WARM and Humid climate [Refrigator → less than 10°C not appropriate for fungi Growth]

Structure – Fungi mainly multicellular (Except → Yeast – Unicellular fungi)
↓
Filamentous



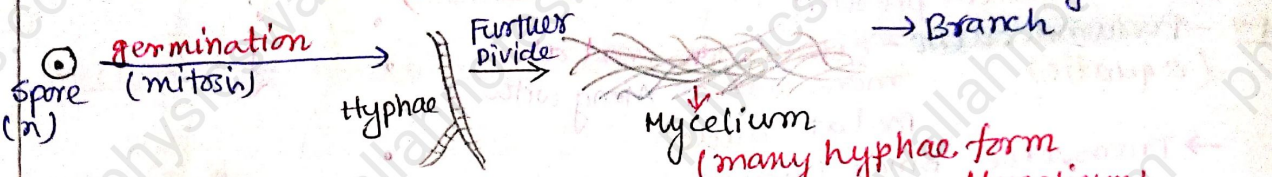
→ Fungi is made up of hyphae (thread)
→ thread like
→ Slender
→ long.



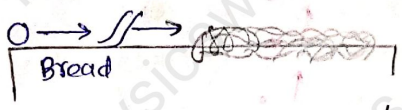
Two type Hyphae

Aseptate
→ long tube, multinucleated.
(all nucleus in common cytoplasm)
→ Another term ⇒ coenocytic

Septate
→ nucleus.
→ septa present which Divide cytoplasm
→ Branch



Spore (n) —germination (mitosis)→ Hyphae —Further Divide→ Mycelium (many hyphae form Mycelium)

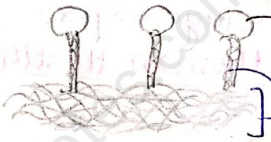


n × hyphae = Mycelium.

Some of the structure form by Hyphae.

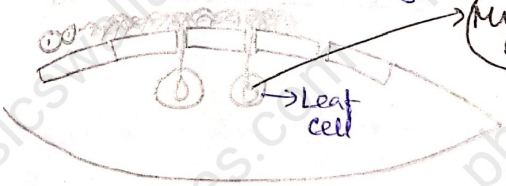
① Simple Mycelium – Horizontal Growth of Hyphae.

② Fruiting Body –
→ Aerial Mycelium.



Mycelium – Grow in Air (to make spore)
* Some mycelium form → fruiting body.

③ Haustoria :- In parasitic Fungi

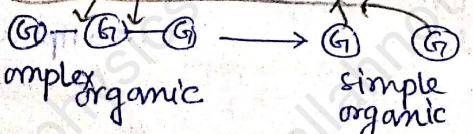


Mycelium Absorb Food → Haustoria,

Cell detail :- (Fungi)
① Eukaryotic cell
② well defined nucleus.
③ No chloroplast But Mitochondria present
④ ER, Golgi body, Lysosome
⑤ cell wall → mainly chitin (Polymer of NAG)
→ some other carbohydrate (polysaccharides)
⑥ storage → Glycogen and oil

Nutrition in Fungi :- (Heterotrophic)

① Saprophytic – Nutrition (Maximum type)
Decomposers – Role
→ Enzyme Release outside and break complex food into simple
→ Break Dead Plant and Animal



Fungi mainly Absorb (organic)

② Parasitic
→ parasitic on plant and Animal.

③ Symbiotic
ⓐ Lichen
ⓑ Mycorrhizae

* In association with algae (Lichen)
* with Roots of higher plants (mycorrhiza)

Lec 6

Examples

Phycomycetes (3) – Albugo, Rhizopus, Mucor

Ascomycetes (8) – Penicillium, ~~Agaricus~~, Aspergillus, claviceps, Neurospora, Morels, truffles, yeast, Giberella.

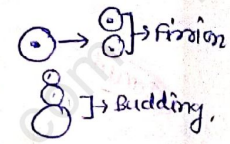
Yeast
Saccharomyces cereviciae
Monascus purpureus

Basidiomycetes (5) – Toad stool, Puf ball, Agaricus (Mushroom), Ustilago, puccina

Deuteromycetes (3) – Alternaria, Colletotricum, trichoderma

Reproduction – Type

Vegetative → Budding → } unicellular Fungi → yeast.
→ Fission → }
→ Fragmentation → Multicellular, Filamentous Fungi show this type of Reproduction.
→ most common type



Asexual → spore form.

Sexual → Gamete form which fuse to form zygote.

Asexual Reproduction

⊙ Spore (n) (single cell) $\xrightarrow{\text{germination}}$ hyphae (n) $\xrightarrow{\text{mitosis}}$ Mycelium (n)

For Asexual Reproduction Mycelium develop Fruiting body.

Mitosis ← ⊙ (n)

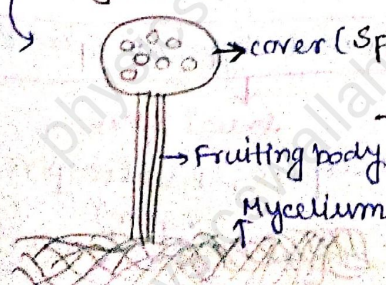
Spore $\xrightarrow{\text{Mitosis}}$ hyphae → Mycelium → Fruiting body (n) → Spore (n) → Mitosis.

Main feature – occur By spore develop on haploid Fruiting Body.
→ Mitosis occur no meiosis.

Type of Spore – (special concept) (single cell, haploid)

① Zoospore and (Aplanospore) → non motile spore
↓ Motile spore → Flagella present (Aquatic life)
↓ Flagella Absent → (normally in Fungi present in terrestial).

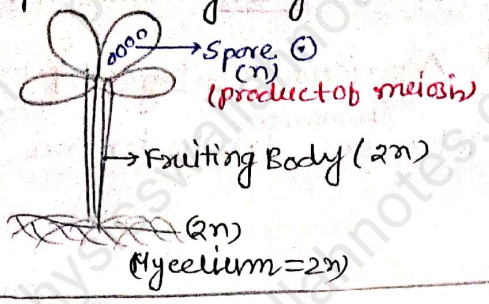
② Endogenous and Exogenous → spore form without cover



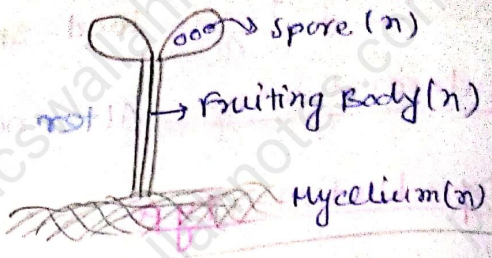
→ Endogenous (spore produce inside some cover)

③ Sexual and Asexual Spore :

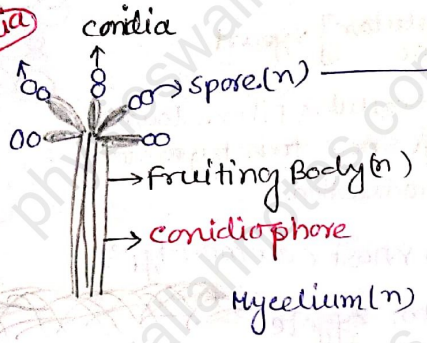
Sexual spore (Meiospore)
→ product of meiosis on Diploid Fruiting Body



Asexual spore (Mitospore)
→ on haploid Fruiting Body
spore develop due to Mitosis



Conidia

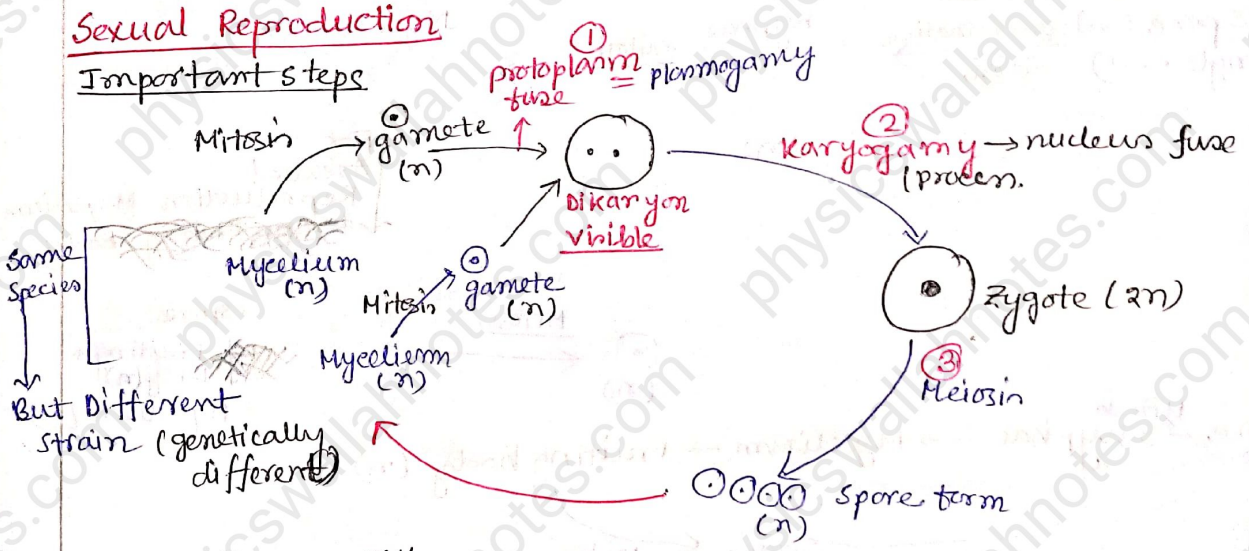


→ Flagella – not present (non-motile) → Aplanospore
→ Exogenous
→ product of Mitosis / Asexual spore.

~~Conid~~ Conidia → non-motile / Aplanospore
→ Exogenous
→ Asexual spore

Sexual Reproduction

Important steps



Process – Plasmogamy
Result – Dikaryon
Steps – Hyphae / Mycelium of two compatible mating type (same species) Form gametes which show Following step

ⓐ Plasmogamy → Fusion of protoplasm of gamete → Result was Dikaryon
ⓑ Karyogamy → Fusion of nucleus → Result is Diploid ~~nucleus~~ zygote.
③ Meiosis → Diploid Zygote / Fruiting Body undergo meiosis → Result is Spore.

✱ Phycomycetes → ~~Karyogamy~~ ✗ Plasmogamy followed By immediate Karyogamy → (Dikaryon not visible)

→ In Fungi During sexual Reproduction Different type of Spore Form
↓
Sexual Spore,
(Ascospore, Basidiospore, Oospore)

Some observation

① Dikaryon visible in which groups – Ascomycetes, Basidiomycetes.

② Dikaryon and Binucleate

Dikaryon (generally non-identical)

Binucleate/ Genetically same.

③ Zygotic meiosis or not

yes occur in Fungi.

Zygote (2n) → Fruiting Body (2n) —Meiosis occur.→ Spore.

Classification of Fungi

On the Basis of — ① Structure of Mycelium (Aseptate or Septate)
② Structure of Fruiting Body (Sexual Fruiting Body)
③ Mode of Spore, (Sexual spore)

Classification of Fungi

- Sexual Reproduction present
  - Lower Fungi (Aseptate)
    - Phycomycetes → Algal Fungi
  - Higher Fungi (Septate)
    - Ascomycetes → Sac Fungi
    - Basidiomycetes → Club Fungi/ Shelf Fungi
- Sexual Reproduction Absent
  - ① Deuteromycetes (Fungi imperfecti)

Phycomycetes (Algal Fungi)

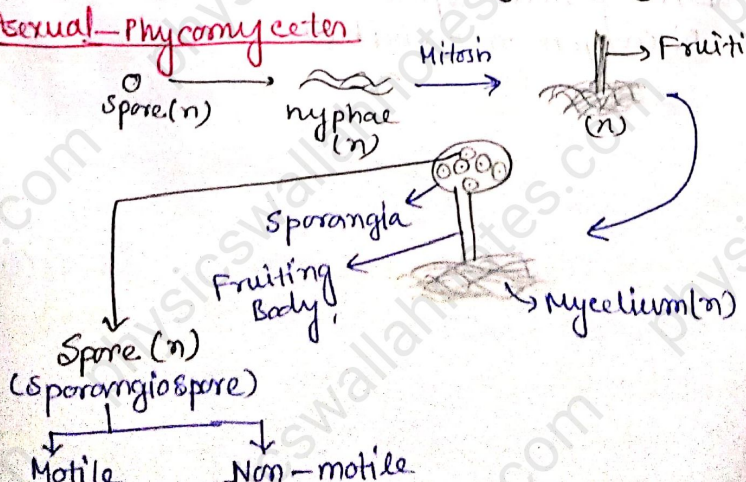
Habitat:- Grow on Decaying Substance, (Aquatic), some on decaying wood. (many are obligate parasite)

Structure:- Aseptate, Coenocytic, Multinucleated

Nutrition:- Saprophytic, Parasitic (obligate parasite), symbiotic.

Reproduction:- ① Vegetative:- Fragmentation
② Asexual → Motile spore (zoospore) and non-motile (Aplanospore) (Endogenously)

Asexual – Phycomycetes

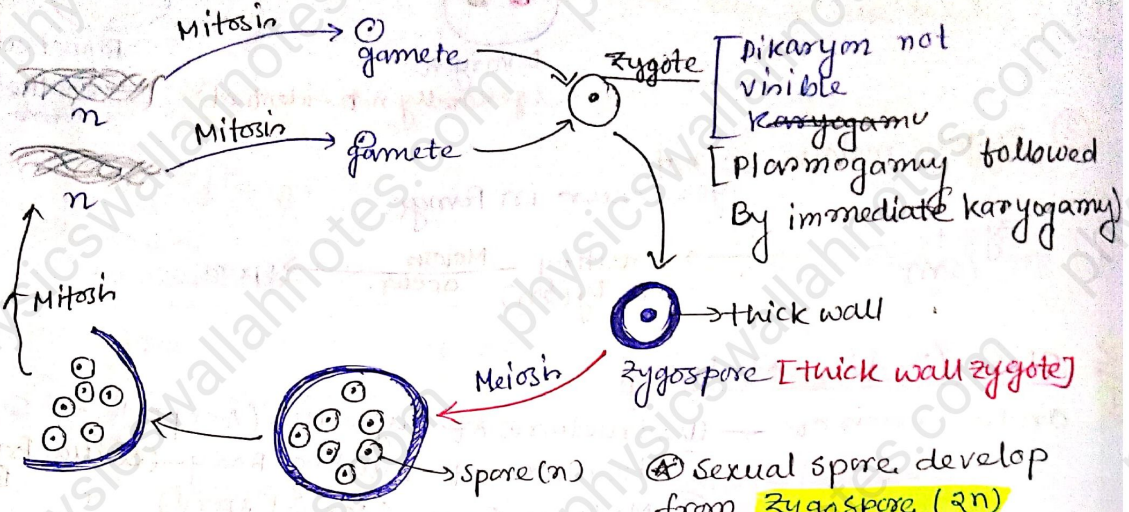


Ⓐ In Phycomycetes haploid Fruiting Body Form (Spore haploid)
Ⓐ Spore – Endogenous
Ⓐ Motile or non-motile.

Sexual Reproduction

(Hyphae/Mycelium $\xrightarrow{\text{Mitosis}}$ ⊙ gamete. (Isogamous, Anisogamous, Oogamous)

(Note – Albugo)



Ⓐ Sexual spore develop from Zygospore (2n) (Endogenous)

Example – Albugo, Rhizopus, Mucor (Bread Mould)
↓
(Disease in mustard leaf)

Phycomycetes

Oomycetes (oosporeform)
→ cell wall – cellulose
→ some member Aquatic (zoospore)

Example – Albugo
→ Phytophthora, (Late Blight of potato)

↓ (zygospore)
Zygomycetes
→ cell wall – chitin.
→ Non-Aquatic (Aplanospore)

Ex – Rhizopus
Mucor

a) Motile – Spore

① Albugo
② Rhizopus
③ Gelidium – Red Algae
④ Nostoc – Non-motile.

Important observation

① Hyphae – Aseptate
② Vegetative Reproduction → Fragmentation
③ Asexual Reproduction → Endogenous → Motile / Non-motile
④ Asexual Reproduction → Endogenous spore, (Dikaryon not visible).

Ascomycetes (Sac Fungi)

Habitat:- Saprophytic on decaying, Grow on dung (coprophilus)

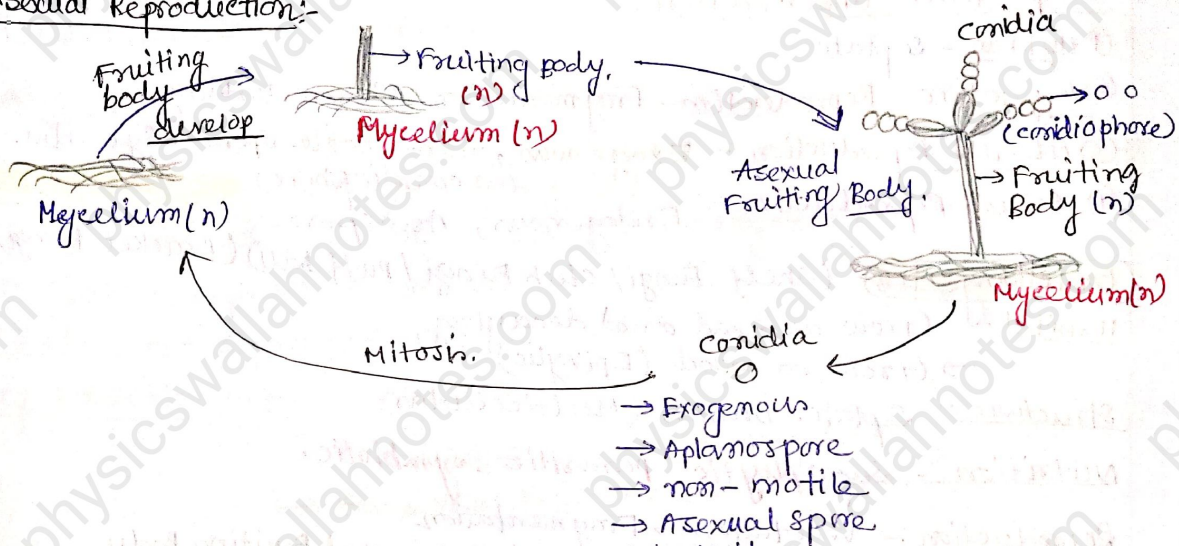
Structure:- Septate, Branch, [mostly multicellular Filamentaous. Exept – unicellular yeast]

Nutrition:- saprophytic,
parasitic,
symbiotic (In lichen mostly Ascomycetes)

Reproduction:- ① Vegetative → Fission, Budding, Fragmentation

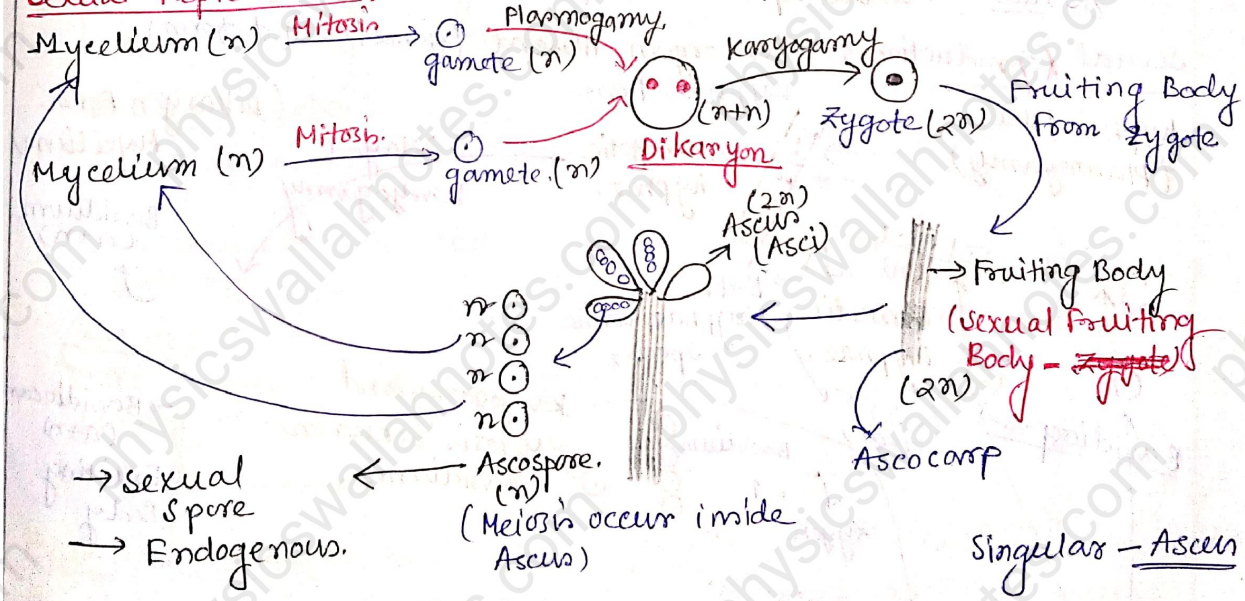
② Asexual → Exogenous Asexual spore, non – motile (conidia)

Asexual Reproduction:-



- → Exogenous
- → Aplanospore
- → non – motile
- → Asexual spore
- → haploid

Sexual Reproduction:-



→ Sexual Spore
→ Endogenous.

(Meiosis occur inside Ascus)

Singular – Ascus

Examples:-

① Yeast (Saccharomyces → Brewer's Yeast, Baking yeast)
Monascus purpureus → statin (Cholesterol lowering Agent)

② Penicillium (Green mould) → penicillium notatum (First Antibiotic)
penicillium Roque forti (Roquefort cheese)

③ Aspergillus → Aspergillus niger (citric Acid)
Aflatoxin – (cause liver cancer)

④ Neurospora – Drosophila of Plant Kingdom.
(Many genetics and Biochemical studies)

⑤ Claviceps → produce LSD (Lysergic acid Diethyl amide)
~~Hallucing~~ (Hallucinogen –

⑥ Morels / Morchella.
truffles] → Edible (Delicacies) (Delicious)

Important observation :-

① Hyphae – Septate
② Vegetative Reproduction – Fragmentation, Fission, Budding.
③ Asexual Reproduction – Exogenous, non-motile spore – By conidia. (on conidiosphore)
④ Sexual Reproduction :- Endogenous, Ascospore.

Basidiomycetes (Shelf Fungi / Club Fungi / Puff ball) (Bracket Fungi)

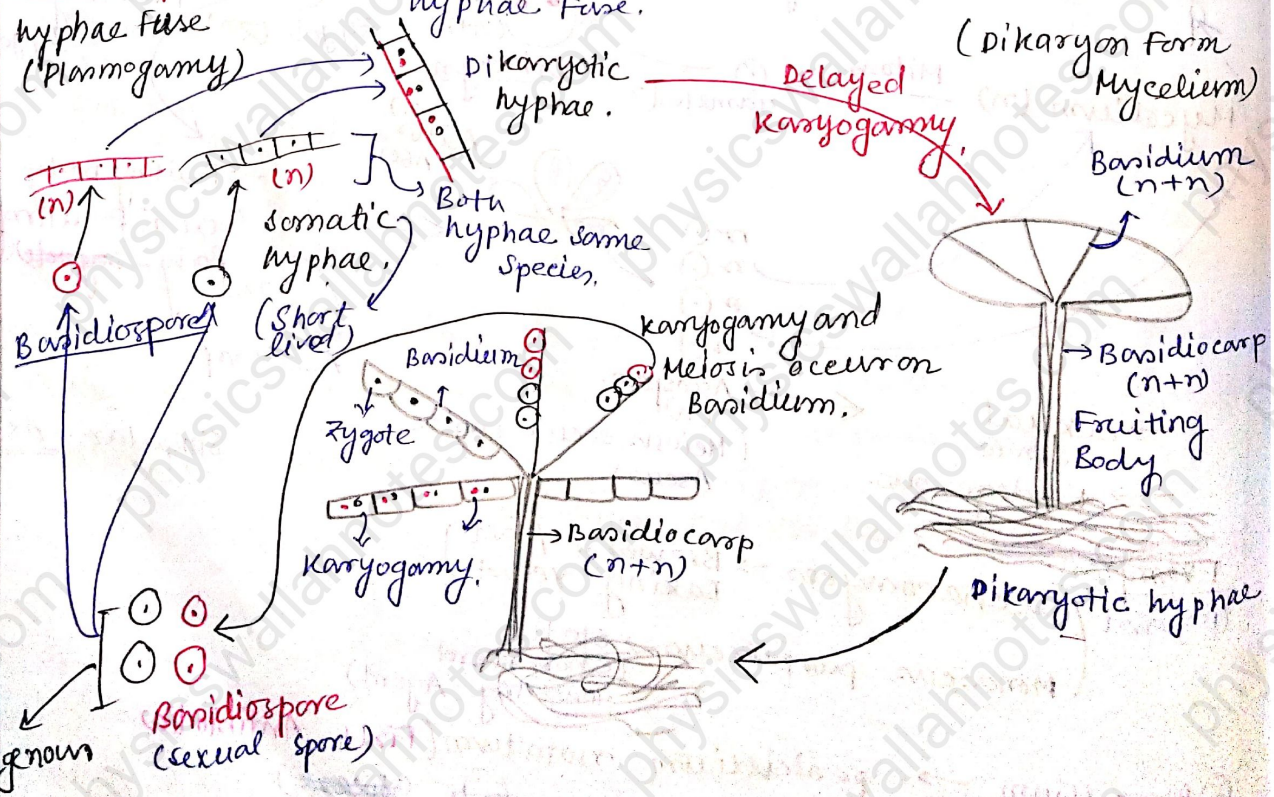
Habitat – Grow on dead and decaying.
→ Grow on wood (Epixylic)

Structure – Septate branch (Meelticellular)

Nutrition – Saprophytic, parasitic, symbiotic.

Reproduction – Vegetative → Fragmentation
Asexual → Asexual spore Absent / No Asexual Fruiting Body.

Sexual Reproduction :- sex organ Absent (gametes not form.)



Important Observation :-

① Hyphae - Septate
② Vegetative Reproduction - Fragmentation.
③ Asexual Reproduction - Asexual Spore, Asexual Fruiting Body Absent
④ Sexual Reproduction - Exogenously produce sexual spore, (Delayed karyogamy)

Example -

① Toad Stool — Poisonous Mushroom,
② Agaricus — Mushroom Edible.
③ Ustilago - cause Smut [U|S]
④ Puccinia - cause Rust (Stipe Rust)
⑤ puf ball -

Deuteromycetes :- (Fungi imperfecti)

Habitat - Saprophytic, decomposers, (Mineral cycling)
Structure - septate, branched
Nutrition - saprophytic, parasitic
Reproduction → Fragmentation
→ Asexual spore - conidia (Exogenous)
→ ~~Ase~~ Sexual Reproduction - Absent

(Asexual Fruiting Body - Imperfect stage
Sexual Fruiting Body - Perfect stage)

Deuteromycetes :-
↳ Temporary group for those fungi → In which sexual / perfect stage not observed.

→ Features indicated - they should be placed → Ascomycetes, But we are not placing it
~~But we~~ out of Three Basis of Classification
↳ Two are Related to sexual Reproduction.

Examples :- ① Alternaria (Early Blight of Potato) (Famine of Bengal)
② colletotrichum (Red Rot Sugar cane)
③ Trichoderma (Biocontrol Agent, Cyclosporin A)

Q) Few Example are given
Mucor, (yeast) Albugo, Puccinia, Alternaria, colletotrichum, Aspergillus.
Phyco [Asco hyphae Absent] Phy Basi Deu Deu Asco.

ⓐ Septate hypae - puccinia, Alternaria, colletotricum, Aspergillus.
ⓑ parasitic - Albugo, puccinia, Alternaria, colletotricum, Aspergillus,
ⓒ Saprophytic - Mucor, yeast

Lec 8

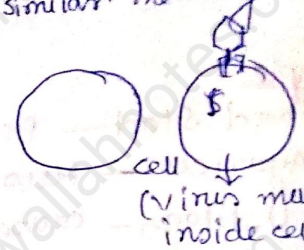
Parasitic → Albugo, Alternaria.

Saprophytic → Penicillium, Puffball.

Virus

VIRUS

Basic Feature ① Acellular and non-cellular
↓ not made up of cells
↓ It is not cell → similar meaning



(Virus multiply inside cell)

② Intracellular parasite (Inside cell Active)

③ Obligate parasite – It can not survive without ~~cell~~ host cell

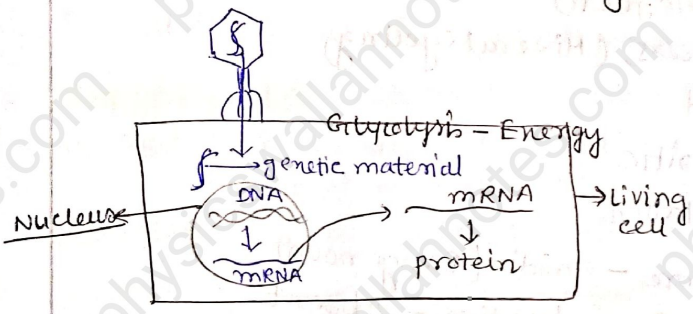
④ Exception of cell theory –

⑤ Virus have Either DNA or RNA → never both together
↓
RNA It present as a Genetic material

⑥ Virus control host machinary

⑦ Some Enzyme present in virus,

⑧ Ultramicroscopic



Some procen and structure given – check whether present in virus.

① Glycolysis → X (not occur in virus)

② ~~Transcription~~ Transcription, Translation → X (virus need host machinery)

③ Ribosome X (virus can not make its own protein)

④ Protein → ✓ (virus have protein but not have protein making machinery)

⑤ DNA → ✓

⑥ RNA → ✓

⑦ DNA Replication → X

⑧ Mitochondria X

⑨ DNA Replication X

Q) ① Which of the following Absent in virus
(a) Uracil
(b) Adenine
(c) Enzyme
(d) ATP

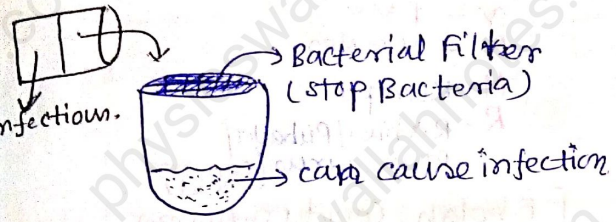
Q) ② Which of the following present in virus
(a) DNA Polymerase
(b) RNA Polymerase (No Replication in virus)
(c) ER
(d) RNA
(e) Transcription, X

Q) ③ Which of the following present in virus.
(a) Reverse transcriptage → Enzyme
(b) Reverse Transcription → procen X
(c) Both a and b
(d) DNA and RNA together.

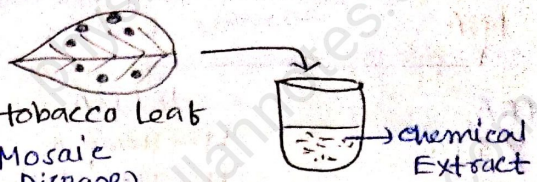
Discovery → pasteur
→ Ivanowsky
→ Beijerinck
→ Stanley

① Term ~~coi~~ Virus coined By Pasteur.

② 1892 – Ivanowsky → Size of virus is smaller than bacteria.



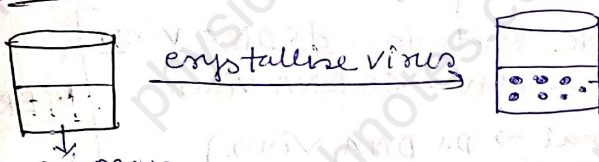
③ Beijerinck – 1898



↓
can cause fresh Infection

"Contagium vivum fluidum"
or
'Infection causing living liquid'

④ 1935 – Stanley

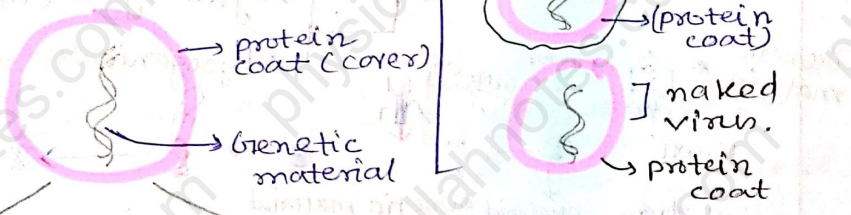


Mainly have protein.

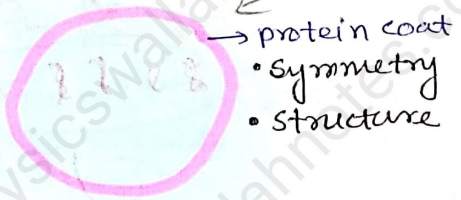
Before work of Stanley virus was nothing But a poisonous Fluid. First time Stanley crystallise virus → And proposed it is made up of protein.

Structure of Virus :-

→ virus is non cellular – It is not cell structure have two part



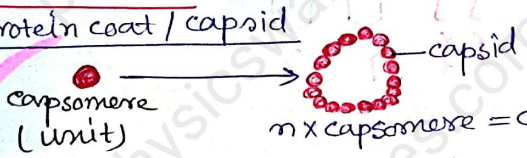
main Role – Protection of Genetic material.



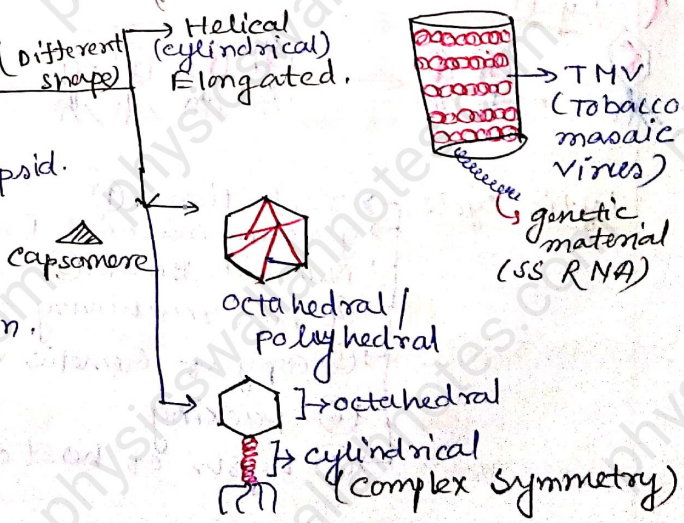
Genetic material.
• RNA
• DNA

Protein coat

protein coat / capsid



(different shape)



Virus = nucleic Acid + protein = nucleoprotein.

Q) which of the following is not nucleoprotein.
(a) virus (nucleoprotein)
(b) Ribosome (RNA + protein)
(c) Chromatin (DNA + histone
(d) Microtubule (protein)

Genetic material (In all living cell → DS DNA is genetic material)

(But in virus 4 possible genetic material present)

- DNA → name of virus.
  - SSDNA
    - Φ X 174
    - chp-6 (Class-12)
  - dsDNA
    - H – Herpes
    - H – Hepatith
    - C – Chicken pox
    - C – cyanophage (Lambda phage) (Bacteriophage)
- RNA
  - SSRNA (+trick)
    - H – HIV
    - I – Influenza
    - V – TMV
    - M – Measles
    - M – Mumps
    - R – Rabies / Rubella / Rhino virus (common cold)
    - [Ebolah, Covid, Influenza, Nipah, Omicron]
  - dsRNA
    - Reo virus.

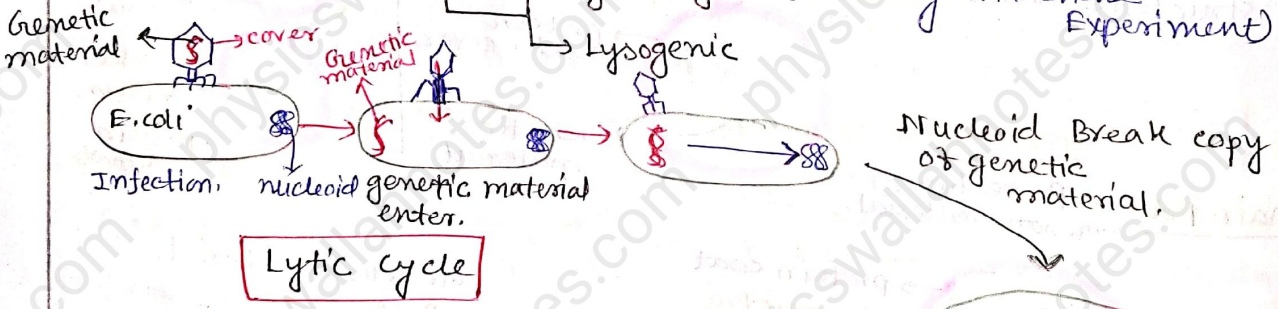
→ Bacteriophage – Virus which attack Bacteria – dsDNA virus
→ Phytophage – virus attack plant – TMV – SS RNA virus.
→ Zoophage – Virus attack Animal → DS DNA Virus, SS RNA virus, DS RNA virus (SS DNA virus)

NCERT

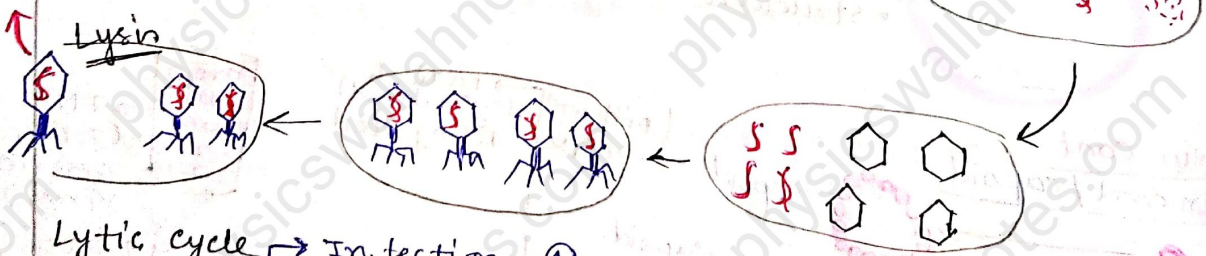
NOTE – (QB bacteriophage – Exception)
(SS RNA virus)
↳ chp-6 (Class-12)

Virus infection cycles :-

- Lytic cycle (Harshey and chase Experiment)
- Lysogenic



Lytic cycle

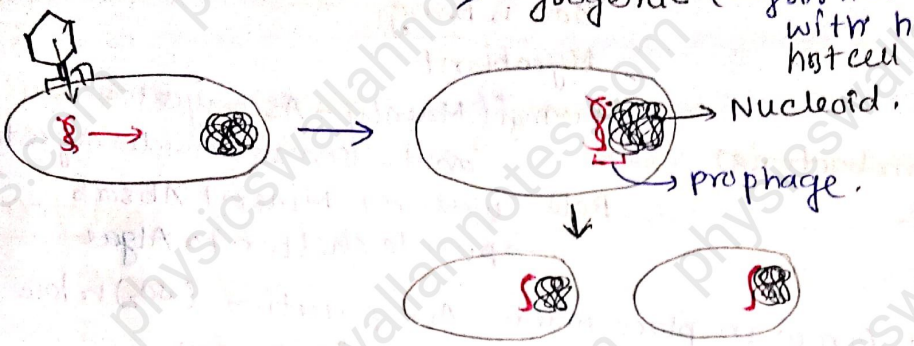


Lytic cycle
1. Infection – ①
2. genetic material Enter – ②
3. Nucleoid Break – ③
4. ④ host machinary capture
5. ⑤ copy of Genetic material form
6. ⑥ Packing
7. ⑦ Lysis of host cell

virus infection cycle

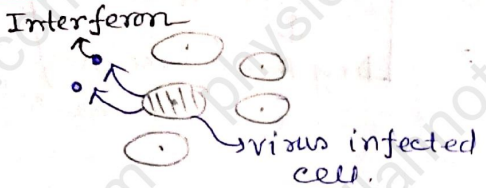
→ Lytic → lysis of Bacterial cell (Host cell).
virus = Bacteriophage.

→ Lysogenic (Lysis not occur, virus multiply with host DNA) until the host cell become weak.



Prophage
Virus DNA integrate with host DNA

Interferon :→ protein ~~protei~~ produce by virus infected cell which protect neighbouring cell.



NOTE - Virus are Biological agent can cause Cancer.

Viroids (T. O. diener - 1971) [Infection similar to virus]

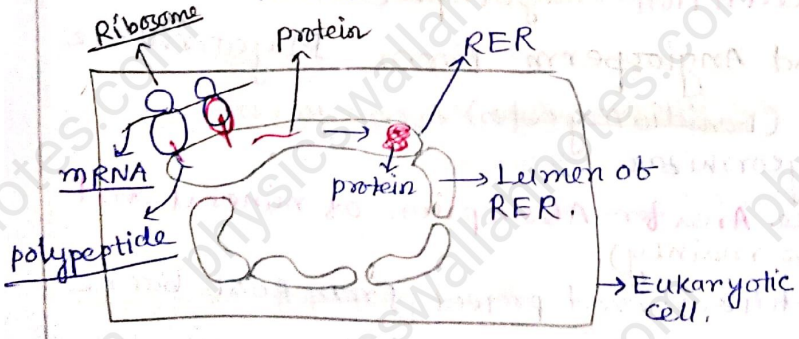
Feature → (a) Protein coat / capsid Absent
(b) Nucleic Acid → genetic material
(b) Single strand RNA → SSRNA (nucleic acid)
(c) Size of viroids is smaller than virus
(d) Molecular weight low

Single Strand RNA (coiled circular)

Disease - PSTD (Potato Spindle tuber disease)

Prions :-

they are infectitious protein.
↓
which interfere with protein folding.



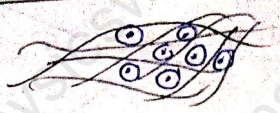
Features
① only made up of protein
② No Genetic material
③ can be infectitious.
④ Interfere with protein folding
⑤ Brain Related Disorder
⑥ Size similar to virus.
⑦ Molecular weigh nearly similar to virus)

Disease - Mad cow Disease / Bovine Spongiform Encephalopathy.
CJD - Crutzfeldt Jacob disease (Brain Related Disorder)

Virus	Viroid	Prions
nucleic Acid + protein	nucleic Acid	protein.
High Molecular weigh	Low molecular weight	High molecular weigh.
Size → ~~small~~ big	Size → small	Size - big (almost same as virus)

Lichen

→ Symbiotic association of Algae and Fungi



- 10% of Lichen → Phycobiont
  - → Algae — single cell ((Green Algae + cyanobacteria) (Chlorella)
  - Role — Photosynthesis
- 90% is Fungi → Mycobiont
  - Fungi (Mainly — Ascomycetes and some Basidiomycetes)
  - Role — water + Mineral Absorb → provide shelter to Algae

Lichen Role :- ① They Grow in place where Air pollution (SO_2) is low.

② Lichen come first in plant sucession (pioneer) (produce Lichenic Acid to form soil)

[xerarch → Dry Area sucession]

③ Litmess → obtain from Lichen.

④ Rein deer moss — Lichen (Edible)

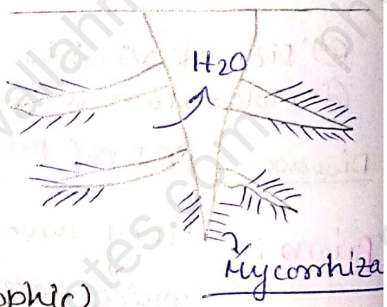
⑤ Medicinal Role

NOTE :- Sexual Reproduction is Absent

Mycorrhizae :-

→ It is Fungal Association with Roots of higher Plants

- Gymnosperm
- Angiosperm.



Feature :- ① Mycorrhizae form in Less mineral ~~Soil~~ Soil (Less nutrition — oligotrophic)

② Both Gymnosperm and Angiosperm Form Mycorrhizae

③ Fungi — Genus — Glomus (~~Basidiomycetes~~) Ascomycetes, form Mycorrhizae

④ Role → ⓐ Increase surface Area for Absorption of mineral and water (Phosphorus mainly)

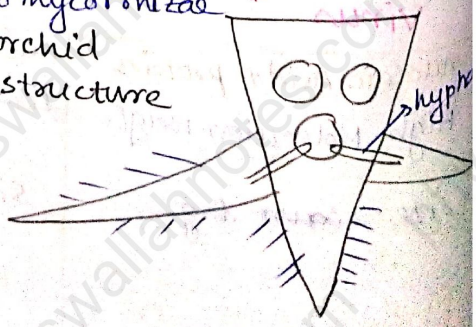
ⓑ They are Biofertilizer and protect from Root borne pathogen

ⓒ Protect from salinity and Drought

Two Type of Mycorrhizae

- Ecto-mycorrhizae
  - Ex-pines.

- Endomycorrhizae
  - Ex-orchid
  - Forma structure
  - VAM → Vesicular Arbasicular Mycorrhizae,



Kingdom of classification - Chp-2
System of classification - Chp-3

What is classification :-

→ It is a method where we group organism in category.
→ Human Earlier classification → Based on need [Food, timber, Requirement]
(no. scientific Basis]

Aristotle :- First time use scientific Basis of classification.

Basis of classification → Morphological Character.

Plants classify → herbs, shrub, Trees.
Animals classify → with R.B.C (Enaima)
→ without R.B.C (Anaima)

Kingdom System :-

18th century - carolus Linnaeous → classify plants and Animal into Kingdom.

Basis → cell wall

Two kingdom classification :-

By - carolus linnaeus
Basis - ~~Ete~~ cell wall → plantae
no cell wall → Animalia

Plantae
→ Algae, Broyophytes, pteridophytes, Gymnosperm, Angiosperm
→ Bacteria, Cyanobacteria, Archebacteria,
→ Fungi
→ Diatom, Dinoflagellates

Animalia
→ porifera, Coelentrata, Arthopoda, Mollesca, Reptilia, Amphibians, Mammals
→ protozoa (Amoeba, Paramecium)

Drawback of two kingdom :-

① Prokaryotes are kept along with Eukaryotes.
② unicellular kept with multicellular
③ Heterotrophic kept with Autotrophic
④ Less Differentiated (Algae) kept with more Differentiated

This classification, was inadequate as only Few Basis was used → cell wall.

Q) According to two kingdom classification Agaricus (Mushroom) is present in
(a) Plantae
(b) Fungi
(c) Animalia
(d) Protista

Q) According to two kingdom classification nostoc belongs to -
(a) Plantae
(b) cyanobacteria
(c) Monera
(d) Animalia.

After two kingdom classification more basis were used.
↳ like cell wall, cell structure, nuclear membrane, Body organization

Plantae | Animalia

As more system evolve → classification system evolve → our understanding with Plantae and animalia – changed
→ Name of these kingdom is constant – But members / Group change.

Three kingdom Classification (Ernst Haekel create third kingdm – Protista)

Plantae
Algae, Bryophyte, pteridophytes, Gymnosperm, Angiosperm

Animalia
porifera, Coelentrata, Arthropoda, Amphibia, Reptilia, Birds, Mammals etc.

Protista
Fungi
Bacteria.
protozoa,
Diatom, Dinoflagellates.

Q) In three kingdom classification Rhizopus is present in
(a) Plantae, (b) Fungi
(c) Protista. (d) Animalia

QQ) Few Examples are Given.
Marchantia, Mucor, Anabena, Nitrobacter, Amoeba, Limulus, Psittacula, Gonylaux

How many are in in two kingdom classification
(a) Plantae – 5
(b) Animalia – 3
(c) Protista – 0

How many are in in three kingdom classification.
(a) Plantae → 1
(b) Animalia → 2
(c) Protista → 5
(d) Monera. → 0

Four kingdom Classification :- [By Copeland 4th kingdom → Monera]

Plantae
Algae, Bryophyte, pteridophyte, Gymnosperm, Angiosperm.

Fungi

Animalia
Porifera, Coelentrata, Arthropoda, Mollusca etc.

protista
single Eukaryotes – Diatom, Dinoflagellates, Amoeba, Paramoecium (protozoa)

Monera
→ prokaryotes
→ Bacteria, Cyanobacteria,
→ Archaebacteria.

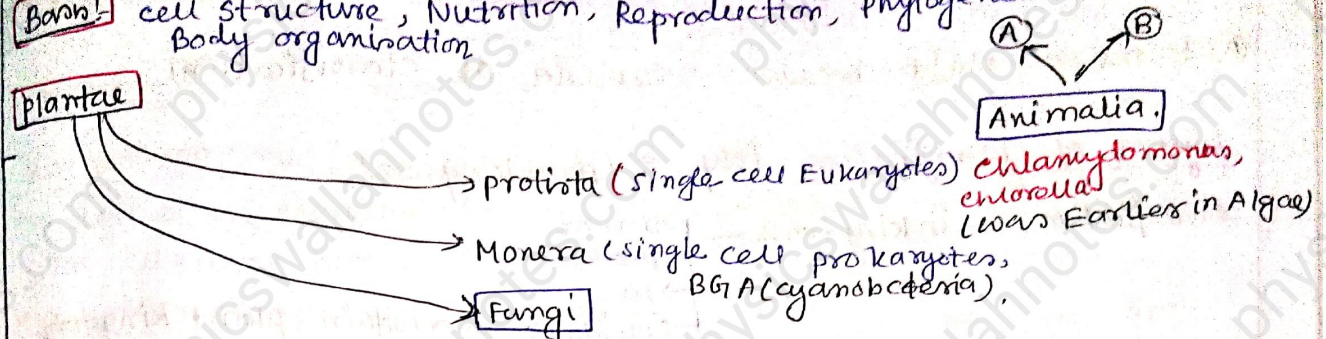
Q) In three kingdom Aspergillus present
(a) Plantae
(b) protista
(c) Animalia
(d) Monera.

Q) In Four kingdom Aspergillus present
(a) Plantae
(b) Animalia
(c) Fungi
(d) protista

Five kingdom Classification → R.H. Whittaker (1969)

5th kingdom – Fungi

Basis: cell structure, Nutrition, Reproduction, Phylogenetic Relationship, Body organisation



Q) How many ~~kind~~ kingdoms

- Prokaryotic cell = 1
- Eukaryotic cell = 4
- unicellular organism only → 2 (Monera, Protista)
- organ system → 1 → Animalia
- organ → Plantae, Animalia
- 3 ← Multicellular
- only Autotrophic – plantae
- Autotrophic (Monera, protista, Plantae)

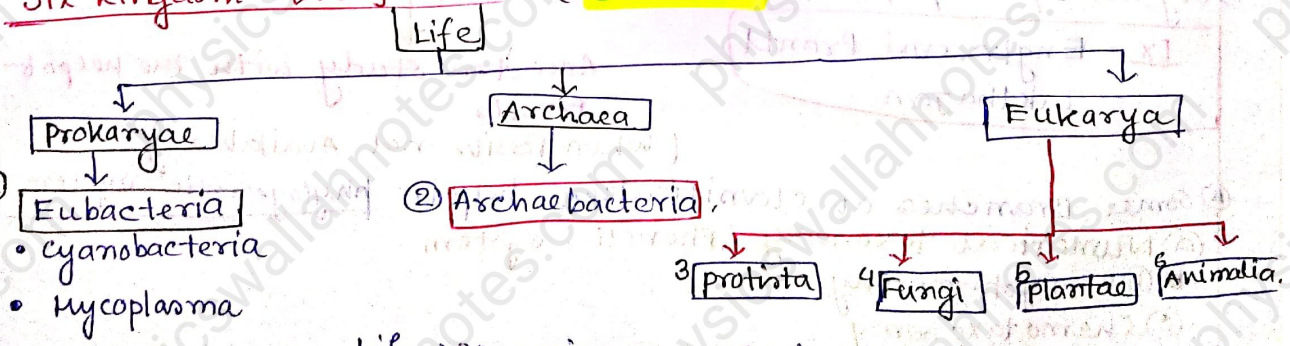
Q) Few Examples are Given

→ Agaricus (Fungi), E. coli (Bacteria), spirulina (cyanobacteria), chrysophytes (protista), Euglena (protista), Trypanosoma (protozoa), Amoeba (Protozoa), Spirogyra (Algae), pteris (Pteridophyta), pinus (Gymnosperm), Cteroplana (Animalia), Bufo (Animalia), Aptenodytes (Animalia), puffball (Fungi), Nostoc (Cyanobacteria)

How many

(a) present in plantae in two kingdom → 10
(b) present in plantae in three kingdom → 3
(c) present in protista in three kingdom → 11
(d) Plantae in four kingdom → 4
(e) Plantae in five kingdom → 3
(f) Monera in three kingdom = 0
(g) Monera in four kingdom = 3
(h) Fungi in five kingdom = 2
(i) Animalia in five kingdom = 3

Six kingdom classification:- (Basis → 16S rRNA, Carl woes)



Life → 3 Domain ⟶ 6 Kingdom.

(*) (Monera ⟶ Divided into two Domain with one kingdom Each)

With time → we include more Phylogenetic relationship → Classification more Refined

* Members shift because → Criteria of classification)

System of classification (Chp-3 (Plant kingdom)

classification — in kingdoms → Monera, Protista, Fungi, Plantae, Animalia,

Plantae → within plant kingdom we also classify organism into Group (Algae, Bryophy

Different Scientist work (in classification)

→ Artificial system
→ B Natural
→ Phylogenetic system

Artificial system :-

Based on :- → Morphology (colour, shape and habit of leaf)

↓

Due to which unrelate come in same group.
Group Appear to Artificial.

→ vegetative and Reproductive character same weightage
[It is not correct that Both Reproductive and vegetative Feature is Given same weightage]

(Reproductive Feature more constant).

Example - Linnaeus use (Morphology of Androecium)

Natural System :-

Basis :- Not only Morphology But other feature (cell structure, Phyto chemistry, Embryology, Anatomy)

when we consider so much character Group Appear to be → Natural.

Ex - Bentham and Hooker → (classification of Angiosperm)

Phylogenetic System :-

→ This system include phylogenetic relationship
→ organism / Group placed in common taxa (category) should have common Ancestor

Ex - Engler and Prantl
- Takthajan

↓

Ancestor study with the help of
Fossils
(when Fossils not Available)

* Some Branches of classification help in phylogenetic system
  - (a) Numerical taxonomy / Phenetic system
  - (b) Karyotaxonomy
  - (c) Chemotaxonomy.

① Numerical taxonomy
(number)
→ Each character is Given code → Vegetative and Reproductive character Equal weightage → computer based programme to find common Ancestory.

Nucleus
↓
② Karyotaxonomy / cytotaxonomy :-
↑
cell.

It depend on chromosome number, structure and behaviour
(In cell except from chromosome no other character use for this)

③ Chemotaxonomy :-
Some specific chemicals like Nicotine drugs – use Basis of classification.